

**Emotional intelligence
in children and adolescents:
In search of a theoretical framework and
improved assessment methods**

Elke Veirman

Promotor: Prof. Dr. Johnny R. J. Fontaine

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CHAPTER 1

General Introduction

Abstract

This first chapter starts with a summary of the literature on emotional intelligence and gives an introduction to the empirical studies of this doctoral dissertation. First, the value of emotional intelligence for society and the importance to examine and improve the validity of current maximum performance emotional intelligence measures in childhood and adolescence is explained. Next, a historical view on emotional intelligence research is presented. Then, the theoretical approaches to emotional intelligence are introduced, explaining the difference between mixed and ability models, whereafter the measurement approaches to emotional intelligence are described, discussing the difference between traditional self-report and maximum performance tests. Based on the historical overview of emotional intelligence and the presented theoretical and measurement approaches to emotional intelligence we take position for the ability model approach and favor maximum performance measurement. After, we address the lack of well-established maximum performance measures in childhood and adolescence and provide a brief description of two tests - the Levels of Emotional Awareness Scale for Children and the Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version - that have been developed for use in childhood and adolescence, we discuss their validity evidence, and identify their limitations. At the end of this chapter, the need to investigate and improve the validity of these two tests is explained. The overarching research questions of the current dissertation are proposed and a short outline of the conducted studies is presented.

INTRODUCTION

The past two decades, emotional intelligence has witnessed unparalleled interest in both popular (e.g., Goleman, 1995) and scientific psychology (e.g., Salovey & Mayer, 1990). Emotional intelligence has been proposed to consist out of a set of emotion-related abilities that involve reasoning about emotions and using emotions to assist reasoning, extending the classical intelligence approach in important ways (Mayer, Roberts, & Barsade, 2008). These emotion-related abilities are believed to contribute to success in life (Matthews, Zeidner, & Roberts, 2007). Emotional intelligence has therefore been claimed to be an important predictor of various outcomes in educational environments (e.g., learning; Barchard, 2003), the workplace (e.g., selection of employees, behavior of employees and employers; Côté & Miners, 2006) and clinical contexts (e.g., treatment; Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009; Nelis et al., 2011). Accordingly, emotional intelligence is of significant importance for society. Its implementation in psychological tests and training material costs, however, a substantial amount of money. Research investigating emotional intelligence and the applicability of emotional intelligence is therefore essential. Especially because the field of emotional intelligence research is still discussing about how the concept of emotional intelligence has to be theoretically defined and empirically assessed.

Within this context, the present literature overview serves multiple purposes. First, the origins of emotional intelligence are described and it is shown that emotional intelligence offers a new way of looking to the historical debate on the relationship between emotions and intelligence. Next, the mixed model approach and the ability model approach to emotional intelligence are explained and self-report measurement and maximum performance measurement of emotional intelligence are discussed. At the end of this overview, we discuss why we take position for the ability model approach and favor maximum performance measurement in the current dissertation. Over the years, many researchers decided to define emotional intelligence in agreement with the ability model approach. Despite a wide variety of maximum performance measures for use in adulthood has been developed and studied, research has only recently turned attention to the development of such measures for use in childhood and adolescence. The few available child and adolescent measures are derived from

their adult precursors, yet, it is not clear whether they have a similar meaning and function the same way. Due to the scarcity of empirical evidence on these measures, the main objective of the current dissertation is to investigate and improve the validity of two state-of-the-art maximum performance measures in children and adolescents, namely the Levels of Emotional Awareness Scale for Children and the Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version. Guiding research questions of the current dissertation are proposed and a short outline of the conducted studies is presented.

A HISTORICAL VIEW ON EMOTIONAL INTELLIGENCE RESEARCH

In the period between 1900 and 1969, intelligence research and emotion research were narrow and separated fields. This epoch was characterized by an exponential growth of research on intelligence and the development of the first intelligence tests (Mayer, 2001). In 1920, Thorndike wrote about the existence of several types of intelligence, that is, a mechanical, an abstract and a social type (Landy, 2005). He considered social intelligence as the ability to perceive the internal state, motives and behavior of the self and others, and to act wisely based on the gathered information: "The ability to understand and manage men and women, boys and girls, and to act wisely in human relations" (Thorndike, 1920, p. 228). Later on, Wechsler stated that intelligence incorporates intellectual and non-intellectual elements and defined intelligence as follows: "The aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment" (Wechsler, 1958, p. 7). More specifically, the non-intellectual elements refer to affective, personal and social factors that are essential keys to predict success in life (Wechsler, 1940, 1943). Due to apparently discouraging efforts to identify a social intelligence, the conceptualization of intelligence remained in essence cognitive. Research on emotions was predominantly focused on the chicken-and-egg problem. It was questioned whether a physiological reaction was followed by an emotional experience or the emotional experience gave rise to the physiological reaction. At the same time, it was discussed whether emotions are culturally determined and idiosyncratic or on the contrary possess a universal meaning (Mayer, 2001). The term emotional intelligence was used on an occasional and inconsistent basis. In a literary critic, it was noted that some characters within Jane Austen's book

"Pride and prejudice" exhibited "emotional intelligence" in comparison to others (Van Ghent, 1953, p. 103). Emotional intelligence was referred to as "...emotionally informed intelligence - or shall we say, that intelligence which informs the emotions ..." (Van Ghent, 1953, p. 107). In a prefeminist German article on motherhood, it was speculated that if women have a lack of emotional intelligence this may result in a rejection of their roles as mothers and housewives (Leuner, 1966).

In the period between 1970 and 1989, research on emotions and research on intelligence became integrated in the new field of cognition and affect, putting the interaction between thoughts and feelings central (Matthews, Zeidner, & Roberts, 2002). The meaning of emotions, the specific conditions under which they arose and their influence on thought was studied (Mayer, 1986). Research on artificial intelligence also showed a growing interest in the understanding and reasoning ability of computers with respect to emotional aspects in stories (Dyer, 1983). Furthermore, the idea of multiple intelligences became of great importance. Gardner (1983, 1999) described seven types of intelligence: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal and intrapersonal intelligence. He saw intrapersonal intelligence as the ability to have knowledge of one's own feelings and to explore them, and interpersonal intelligence as the ability to recognize the state of mind, intentions and desires of others. He considered them as important as the more traditional intelligence types. During this time, social intelligence was defined as a multidimensional construct, constituting of social skills, empathy skills, prosocial attitudes, social anxiety and emotionality (Marlowe, 1986). Moreover, brain research identified connections between emotion and cognition (e.g., Ten Houten, Hoppe, Bogen, & Walter, 1985). In this period, the term emotional intelligence appeared more often in the literature. In the abstract of his doctoral dissertation, Payne (1986) used the term emotional intelligence and argued that "the mass suppression of emotion throughout the civilized world has stifled our growth emotionally, leading us down a path of emotional ignorance". He stated that emotional intelligence "involves relating creatively to fear, pain and desire" and expressed that his dissertation offers guidance on "how to relate to them in emotionally intelligent ways." In a *Mensa Magazine* article in 1987, Beasley used the term emotional quotient. He defined emotional quotient and intelligence

quotient as “one's ability to feel” and “one's ability to think” respectively, saying that “emotional quotient is to the heart what intelligence quotient is to the brain” (Beasley, 1987, p. 25). Although suggestions have been made that this is the first published use of the term emotional quotient, Bar-On later claimed to have used the term in an earlier unpublished version of his graduate thesis (Bar-On, 1988).

In the period between 1990 and 1993, the field of emotional intelligence research really emerged. The first introduction of emotional intelligence in scientific literature was made by Salovey and Mayer (1990) by publishing their landmark article, “Emotional intelligence”, in the journal *Imagination, Cognition, and Personality*. They defined emotional intelligence as “the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions” (Salovey & Mayer, 1990, p. 189), and provided also information on the first ability emotional intelligence scale. Three years later, Mayer and Salovey (1993) called for further research on emotional intelligence in a follow-up editorial in the journal *Intelligence*, stating that emotional intelligence might be considered as a standard intelligence. During this time, especially brain research provided further foundation for emotional intelligence (Damasio, 1994).

Five years later, the concept of emotional intelligence rapidly became popularized and broadened after publication of the book “*Emotional intelligence: Why it can matter more than IQ*” by psychologist and New York Times science writer Daniel Goleman (Goleman, 1995). According to him “emotional intelligence refers to the capacity for recognizing our own feelings and those of others, for motivating ourselves, and for managing emotions well in ourselves and in our relationships. It describes abilities distinct from, but complementary to, academic intelligence, the purely cognitive capacities measured by IQ” (Goleman, 1998, p. 317). His book appeared on the New York Times best-seller list. This book, however, also led to strong criticisms and hot debates in the scientific world because it contained inaccurate and scientifically unproven statements. At that time, many other popular books on emotional intelligence popped up and diverse tests were sold as being emotional intelligence measures without appropriate validity evidence.

From 1998 to this date, the number of peer-reviewed published articles on emotional intelligence grew exponentially. Many refinements of the emotional intelligence concept took place and diverse new measures were developed.

THEORETICAL APPROACHES TO EMOTIONAL INTELLIGENCE

Although the fast popularization of emotional intelligence has stimulated academic research, it has also given rise to a wide variety of different models and definitions which caused considerable confusion. These different conceptualizations can be roughly classified into two main approaches: the mixed models of emotional intelligence and the ability models of emotional intelligence. Mixed models believe that emotional intelligence is a mixture of personality traits and non-cognitive skills and competencies, whereas ability models consider emotional intelligence as a type of classical intelligence, dealing with the cognitive processing of emotional information (Mayer, Salovey, & Caruso, 2000). Because the different conceptualizations have become too numerous, the following sections are restricted to the most influential ones.

Mixed models of emotional intelligence

In the mixed model approach, emotional intelligence is defined as “an array of non-cognitive capabilities, competencies, and skills that influence one’s ability to succeed in coping with environmental demands and pressures” (Bar-On, 1997, p. 14). According to this rather broad definition, emotional intelligence embodies a conglomerate of dispositional, motivational, and situational aspects (MacCann, Matthews, Zeidner, & Roberts, 2003).

Two influential models have been proposed, each with a slightly different conceptualization. One of the most frequently cited models is that of Bar-On (1997). His model, that is embedded in a personality approach, consists of five broad emotional intelligence factors that each contain several narrow facets: (1) intrapersonal: emotional self-awareness, assertiveness, self-regard, self-actualization and independence, (2) interpersonal: empathy, interpersonal relationship and social responsibility, (3) adaptation: problem solving, reality testing, and flexibility, (4) stress management: stress tolerance and impulse control, and (5) general mood: optimism and happiness.

A second model is the emotional competence model of Boyatzis, Goleman, and Rhee (2000). Emotional intelligence is here defined as “an ability to recognize, understand, and use emotional information about oneself or others that leads to or causes effective or superior performance” (Boyatzis & Sala, 2004, p. 149). Their model considers emotional intelligence as a set of learned competencies. It distinguishes four main clusters, each consisting of various competencies: (1) self-awareness: emotional self-awareness, accurate self-assessment, and self-confidence, (2) self-management: emotional self-control, achievement, initiative, transparency, adaptability, and optimism, (3) social awareness: empathy, service orientation, and organizational awareness, and (4) social skills: inspirational leadership, influence, conflict management, change catalyst, developing others, teamwork and collaboration.

Ability models of emotional intelligence

In the ability model approach, emotional intelligence is defined as “the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and others” (Mayer et al., 2000, p. 396). Ability models can be divided into two types of models: (1) specific ability models, and (2) integrative ability models. Specific ability models mainly focus on individual mental abilities that are of importance to emotional intelligence. Most of the specific ability models rely on research traditions that were not specifically targeted at emotional intelligence. For instance, emotion perception research stemmed originally from research in nonverbal perception, but also established considerable impact in emotional intelligence research. Integrative ability models propose an integration of those abilities into a comprehensive, overarching model (Mayer et al., 2008).

A well-known example of an integrative ability emotional intelligence model is Lane and Schwartz’s (1987) cognitive-developmental model of emotional awareness. In this model, emotional awareness, or the ability to be aware of one’s own and others’ emotions, is seen as a cognitive ability that develops in stages with age. It has been considered as a separate form of cognitive development that can progress independently from other cognitive domains (Lane & Pollerman, 2002; Lane & Schwartz, 1987). This hierarchically build model distinguishes five stages or levels of progress in emotional

awareness with in ascending order awareness of 1) physical sensations, 2) action tendencies, 3) single emotions, 4) blends of emotions, and 5) blends of these blends of emotions. When people reach a higher level of emotional awareness, new abilities are developed while previous ones are still part of the emotional awareness processing repertoire, although they may be modified (Lane & Schwartz, 1987). Emotional awareness research originally stemmed from research on alexithymia. Later on, emotional awareness became considered as a centerpiece of the emotional intelligence construct (Lane, 2000), especially because people who have complex emotional information at their disposal may use this information to assist higher level emotional processes (such as using emotions to facilitate thoughts, understanding emotions and managing emotions) (Barchard, Bajgar, Leaf, & Lane, 2010).

The integrative four-branch model of Salovey and Mayer (1990) is one of the most widely accepted emotional intelligence models. In this model, emotional intelligence is defined as a broad intellectual factor consisting of four conceptually related hierarchically organized branches of emotion-related abilities (Mayer & Salovey, 1997). The first branch, perceiving emotions, deals with the ability to accurately identify emotions in one's self and others' (non-)verbal behavior. The second branch, facilitating thoughts, involves the ability to use emotions to enhance thinking and reasoning. The third branch, understanding emotions, refers to the ability to label emotions and to recognize relationships and transitions among them. The fourth and final branch, managing emotions, encompasses the ability to successfully manage emotions in oneself and others by maintaining or changing emotions. The first two branches together form experiential emotional intelligence, whereas the last two branches jointly form strategic emotional intelligence. Experiential emotional intelligence and strategic emotional intelligence together form general emotional intelligence.

MEASUREMENT APPROACHES TO EMOTIONAL INTELLIGENCE

The process of test construction for emotional intelligence measures did not account for the fundamental distinction between typical and maximum performance (e.g., Ackerman & Heggestad, 1997; Cronbach, 1949; Hofstee, 2001). While some emotional intelligence measures are based on self-report questionnaires that assess people's typical behavior (e.g., Schutte et al., 1998),

other measures are based on maximum performance tests that assess people's behavior when exerting as much effort as possible (e.g., Mayer et al., 2000). Petrides and Furnham (2000a, 2000b, 2001, 2003, 2006) stated that the use of these different measurement approaches is problematic because both probably yield different results, even if the same underlying model is used. Therefore, they proposed an in part overlapping alternative to the conceptual differentiation between mixed and ability models of emotional intelligence, taking into account the different measurement approaches and operational definitions that are adopted by the mixed and ability model approaches. In specific, they differentiated between trait emotional intelligence and ability emotional intelligence, arguing that self-report questionnaires foster the idea of emotional intelligence as a personality trait (*trait emotional intelligence* or *emotional self-efficacy*), whereas maximum performance tests raise the idea of emotional intelligence as a cognitive ability (*ability emotional intelligence* or *cognitive-emotional ability*).

Since then, various studies have been performed on this issue and these studies indeed all highlight that self-report and maximum performance measures of emotional intelligence do not converge (e.g., O'Connor & Little, 2003; Van Rooy, Viswesvaran, & Pluta, 2005; Warwick & Nettelbeck, 2004). For example, Joseph and Newman (2010b) compared correlations among self-report mixed-based emotional intelligence tests, self-report ability-based emotional intelligence tests, and maximum performance ability-based emotional intelligence tests. They showed that the lowest correlation was found between self-report ability-based emotional intelligence tests and maximum performance ability-based emotional intelligence tests, supporting that trait emotional intelligence and ability emotional intelligence should be considered as two different constructs. In the following section, Petrides and Furnham's distinction is used to discuss current emotional intelligence measurement.

Self-report emotional intelligence measures

Self-report emotional intelligence measures are especially designed to map people's perceptions and beliefs about competencies in particular domains of emotional intelligence (Salovey, Woolery, & Mayer, 2000). In this type of measurement people are generally asked to judge on a rating scale to which

extent they agree or disagree with a series of descriptive statements concerning their own level of emotional intelligence, and often also a number of emotion-related dispositions (e.g., Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006; Pérez, Petrides, & Furnham, 2005; Schutte et al., 1998; Wong & Law, 2002).

Most self-report emotional intelligence measures are based on mixed emotional intelligence models. The most well-known examples are the Bar-On's Emotional Quotient Inventory (EQ-I; Bar-On, 1997), the Emotional Competency Inventory (ECI; Boyatzis et al., 2000), the Trait Emotional Intelligence Questionnaire (TEIQue; Petrides & Furnham, 2003), and the Trait Meta Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). Some self-report emotional intelligence measures are based on ability emotional intelligence models. Most of these took the four-branch model of emotional intelligence as starting point for their development, such as the Self-Report Emotional Intelligence scale (SREI; Schutte et al., 1998), the Wong and Law Emotional Intelligence Scale (WLEIS; Wong & Law, 2002), and the Self-Rated Emotional Intelligence Scale (SREIS; Brackett et al., 2006). It has to be noted that these self-report ability-based emotional intelligence measures do not measure people's actual emotion-related abilities. They only assess self-perceptions of these abilities.

Despite the fact that self-report emotional intelligence measures are widely used to measure emotional intelligence, they are characterized by important weaknesses. First, their discriminant validity has been questioned, because of their overlap with traditional personality measures (e.g., Davies, Stankov, & Roberts, 1998; Joseph & Newman, 2010a; Van Rooy et al., 2005). Recent meta-analytic evidence has for example revealed that (1) substantial correlations exist among the Big Five personality traits and self-report mixed-based emotional intelligence measures (r 's range between .29 and .53) and to a lesser extent self-report ability-based emotional intelligence measures (r 's range between .29 and .40), and (2) only small or no correlations exist between cognitive ability and respectively self-report mixed-based emotional intelligence measures ($r = .11$) and self-report ability-based emotional intelligence measures ($r = .00$) (Joseph & Newman, 2010b). Second, their convergent validity has been threatened because self-report emotional intelligence measures have either weak correlations or unexpected correlations with emotion measures (e.g., Roberts,

Matthews, & Zeidner, 2010). Moreover, the incremental validity of self-report emotional intelligence measures has been criticized. Recent meta-analytic results showed for instance substantial correlations among self-report emotional intelligence measures and physical, mental and psychosomatic health measures (Martins, Ramalho, & Morin, 2010), yet, stressed that these correlations may be derived from their overlap with personality measures. Additionally, while there are substantial correlations among self-report emotional intelligence measures and psychopathology measures (e.g., Bar-On, 1997; Hemmati, Mills, & Kroner, 2004), there is a strong item overlap between these measures (Matthews, Zeidner, & Roberts, 2012; Williams, Daley, Burnside, & Hammond-Rowley, 2010). Furthermore, since self-report emotional intelligence measures rather reflect self-perceived performance instead of actual performance, they are liable to self-evaluation bias. Indeed, it has been consistently shown that people have inaccurate perceptions of their own abilities and tend to overestimate their own abilities (e.g., Brackett et al., 2006; Dunning, Heath, & Suls, 2004; Paulhus, Lysly, & Yik, 1998). Finally, self-report emotional intelligence measures are also liable to response bias, social desirability, deception, and impression management, which are known to be common confounds in other self-report measures (e.g., Day & Carroll, 2008; Grubb & McDaniel, 2007; Matthews et al., 2002; Petrides & Furnham, 2000a; Roberts, Zeidner, & Matthews, 2001).

In light of these weaknesses, many researchers in the field of emotional intelligence consider self-report emotional intelligence measures not appropriate to assess actual emotion-related abilities. It has been proposed that the use of self-report emotional intelligence measures is only justified to investigate the discrepancy between self-perceptions of emotion-related abilities and more objective measures of these emotion-related abilities (Rivers, Brackett, Salovey, & Mayer, 2007).

Maximum performance emotional intelligence measures

Maximum performance emotional intelligence measures are developed to assess people's emotion-related abilities (e.g., Mayer et al., 2008). In this type of measurement, people are presented with a series of items that require emotion-based problem solving and have to select what they think is the most adequate

response. People's answers are then evaluated against a set of predetermined scoring criteria (Roberts et al., 2001).

Maximum performance emotional intelligence measures are typically based on ability emotional intelligence models and assess either one or all four emotion-related abilities of perceiving emotions, facilitating thoughts, understanding emotions, and managing emotions. The measures that assess only one emotion-related ability are mainly focused on the assessment of emotion perception, such as for instance the Profile of Nonverbal Sensitivity (PONS; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979), the Diagnostic Analysis of Nonverbal Accuracy (DANVA; Nowicki & Duke, 1994), the Emotional Accuracy Research Scale (EARS; Mayer & Geher, 1996), the Japanese and Caucasian Brief Affect Recognition Test (JACBART; Matsumoto et al., 2000), the Montréal Set of Facial Displays of Emotions (MSFDE; Beaupré, Cheung, & Hess, 2000), the Emotion Recognition Index (ERI; Scherer & Scherer, 2011), the Multimodal Emotion Recognition Test (MERT; Bänziger, Grandjean, & Scherer, 2009), and the Geneva Emotion Recognition Test (GERT; Schlegel, Grandjean, & Scherer, 2014). One measure, the Levels of Emotional Awareness Scale (LEAS; Lane, Quinlan, Schwartz, & Walker, 1990), assesses understanding emotions (Mayer et al., 2008). To date, only few maximum performance emotional intelligence measures cover the four emotion-related abilities. The MSCEIT (MSCEIT; Mayer, Salovey, & Caruso, 2002) is the successor of the Multifactor Emotional Intelligence Test (MEIS; Mayer, Caruso, & Salovey, 2000), and is the most widely used. Recently, also the Ability Emotional Intelligence Measure (AEIM; Warwick, Nettelbeck, & Ward, 2010) has been developed.

Most research findings stem from the MEIS and the MSCEIT tests. Contrary to self-report emotional intelligence measures, these measures have shown convergent and discriminant validity. For example, meta-analyses have found moderate correlations with intelligence, and small correlations with the Big Five personality traits (Roberts, Schultze, & MacCann, 2008; Van Rooy et al., 2005). It is, however, troubling that the MSCEIT fails to converge with the JACBART and other performance-based measures (Farrelly & Austin, 2007; Roberts et al., 2006). Furthermore, these measures have to some extent incremental validity over intelligence and personality in predicting criteria of social and emotional functioning (Lopes et al., 2004; Martins et al., 2010). It has been

suggested that the typically modest correlations show that what is measured is helpful, but not of critical importance in real-life contexts (Matthews et al., 2012).

One of the main issues in maximum performance emotional intelligence measures is that responses to emotion-related questions cannot be objectively scored because there are no straightforward criteria for what constitutes a correct response (e.g., Brody, 2004; Conte, 2005; Roberts et al., 2001; Wilhelm, 2005). Attempts have been made to overcome this problem mainly by use of expert scoring or consensus scoring. In expert scoring, experts in the field of emotion are consulted to decide on the correctness of responses to emotion-related questions. In consensus scoring, correct responses are determined on what large representative groups of non-experts agree on. Other criteria (i.e., conceptual, correlational, and developmental) are then used to decide on the status of emotional intelligence as a standard intelligence. First, emotional intelligence should consist of a set of mental abilities. Second, it should show the expected correlations with intelligence, personality, and other constructs. And third, it should vary with age and experience (Mayer et al., 2000). Despite the fact that both scoring methods have yielded converging evidence over the years (Mayer, Salovey, & Caruso, 2012), they have also been severely criticized (e.g., Matthews, Zeidner, & Roberts, 2004; Maul, 2012a). Indeed, it has recently been argued that these scoring techniques do not allow to clearly link variation in observed responses to variation in emotional intelligence (Maul, 2012b).

MAXIMUM PERFORMANCE ABILITY-BASED EMOTIONAL INTELLIGENCE MEASUREMENT IN CHILDHOOD AND ADOLESCENCE

Based on the historical view on emotional intelligence research and the presented theoretical and measurement approaches to emotional intelligence the current doctoral dissertation conceptualizes emotional intelligence from an ability model approach and considers only maximum performance measurement appropriate to measure emotion-related abilities. There are semantic, theoretical, and empirical reasons why this position is taken. First, emotional intelligence is build out of a descriptor *emotional* that modifies the noun *intelligence*, parallel to others, like verbal-comprehension intelligence, perceptual-organizational intelligence, or broad-visualization intelligence (Carroll, 1993). Thus, the noun *intelligence* semantically points to a construct that represents a cognitive ability or

a realm of cognitive abilities. Since the mixed model approach on emotional intelligence generally lacks a primary focus on intelligence and blends in a variation of emotion-related dispositions, it falls outside the semantic boundaries of the concept of intelligence (Rivers et al., 2007). Second, theories that conceptualize emotional intelligence as an ability or an array thereof allow for a stronger top-down theory testing compared to the more inductive personality-related conceptualizations of emotional intelligence. Finally, the empirical evidence of maximum performance tests and not self-report questionnaires militates for the ability conceptualization of emotional intelligence, and the empirical evidence of self-report questionnaires for personality conceptualizations of emotional intelligence is rather heterogeneous and more inconsistent (e.g., Mayer, et al., 2008).

Research from the ability model approach to emotional intelligence has primarily focused on maximum performance measurement of emotion-related abilities in adults. However, if we want to fully understand the nature of emotional intelligence, research should also turn its scope to children and adolescents and address the need for valid assessment instruments in younger age groups. Therefore, we focus in this dissertation on two state-of-the-art maximum performance measures for children and adolescents, namely the Levels of Emotional Awareness Scale for Children (LEAS-C; Bajgar, Ciarrochi, Lane, & Deane, 2005) and the Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV; Mayer, Salovey, & Caruso, 2015). In the next paragraphs, each of these two measures is described, the (limited) empirical evidence is presented, and key issues are identified and related to the studies of this dissertation.

Levels of Emotional Awareness Scale for Children

The LEAS-C is the child version of the LEAS and holds likewise a unique position among self-report and maximum performance emotional intelligence measures. Children are not asked to appraise their own level of emotional awareness (as would be the case in typical self-report measures). However, they are also not asked to resolve a problem and responses are not scored on correctness (as would be the case in standard maximum performance measures). Instead, children are asked to describe how they themselves and another character (that

tap the self-perspective and the other-perspective) would feel in a set of 12 real-life scenarios. These scenarios are assumed to elicit the dispositional way children deal with emotional information. Of these 12 scenarios, 10 are slightly modified LEAS scenarios, and two are newly constructed scenarios. Both the theoretical framework and the scoring procedure are identical for the LEAS-C and the LEAS. In line with the cognitive-developmental Levels of Emotional Awareness (LEA) model of emotional awareness, three scores are assigned for each scenario that are meant to reflect the level of emotional complexity in children's descriptions: a score for self-awareness, a score for other-awareness, and a score for total-awareness. At Level 0, cognitions (e.g., I would think it was not a good idea right from the start) are scored. At Level 1, bodily sensations (e.g., I would feel nauseous) or direct states of the lack of an emotional response (e.g., I would feel nothing at all) are scored. At Level 2, actions (e.g., I would feel like I cannot move) or general emotional states (e.g., I would feel good) are scored. Next, single emotions (e.g., I would feel jealous) are scored at Level 3. Furthermore, blends of emotions (e.g., I would feel joy and love at the same time) are scored at Level 4. Finally, combinations of blends that are differentiated for the self and the other are scored at Level 5 (e.g., I would feel ashamed and scared, my friend would feel angry and sad). The self- and the other-awareness scores are based on the highest reported level of emotional complexity in the description and range from 0 to 4. The total-awareness score is equivalent with the highest score of the self- and the other-awareness score. However, a score of 5 is given in case both the self- and the other-awareness score are 4 and the emotion words that are used for the self-perspective and the other-perspective are differentiated.

At the beginning of this doctoral dissertation, empirical evidence was limited to the study of Bajgar et al. (2005). In this study, the initial validation of the LEAS-C was described, based on a sample of 51 children between the ages of 10 and 11. Preliminary validity evidence was provided. A high inter-rater reliability and an acceptable reliability were observed for self-awareness, other-awareness, and total-awareness scores. Emotional awareness was related to the cognitive-developmental level in parental descriptions, vocabulary, verbal productivity, emotion expression, and emotion comprehension. Significant small to moderate positive correlations were found between total-awareness scores and emotion

comprehension, vocabulary, and verbal productivity. Further, other-awareness scores showed significant small to moderate positive correlations with emotion expression and emotion comprehension, while self-awareness scores showed no significant correlations with any of the variables of interest. Gender differences, controlled for vocabulary and verbal productivity, showed that girls outperformed boys for self-awareness, other-awareness, and total-awareness scores. Finally, age differences were studied. Due to the restricted age range in the sample, the LEAS-C scores were pro-rated and compared with normative LEAS data (Lane et al., 1996). While the within-gender means were in the expected direction, showing that lower total-awareness scores were observed for girls and boys in comparison to females and males, these differences were not significant. Thus, the key tenet of the LEA model that emotional awareness develops with age was not supported.

A first explanation for why age differences have not been found may be related to the small sample with a restricted age range in the study of Bajgar et al. (2005). Furthermore, this study was limited in scope because the internal structure was not investigated and only a limited breadth of correlates was studied. Therefore, Chapter 2 of this doctoral dissertation aims to extend the preliminary validity evidence of the original LEAS-C and investigate whether age differences can be revealed in a substantially larger sample with a much broader age range. More specifically, the original scoring procedure is applied and validity evidence is collected by testing the internal structure, studying a much broader network of convergent and discriminant relationships, and investigating gender and age differences in a large sample of children and adolescents with a broad age range.

Another explanation for why age differences have not been found may be related to the original LEAS-C test itself. The instructions and the scoring procedure are mainly focused on feelings while contemporary emotion psychology recognizes a component process definition to emotion with different emotion components considered important (such as appraisal, action tendency, bodily reaction, expression, and feeling) (Scherer, 2005). With respect to the instructions, the word *feel* can be interpreted in different ways as this word is often used in daily life to stress the subjective nature of the emotional experience. Because it may refer to all aspects of the emotion process that can be 'felt'

(Mulligan & Scherer, 2012), children may (1) report on the most salient aspect of the emotional experience (which can be an appraisal, an action tendency, a bodily reaction, or an expression), (2) give a feeling or an emotion term, or (3) provide information on the whole emotion process. The variability in the interpretation of the instructions may lead to construct irrelevant response variation. With respect to the scoring procedure, the highest level of emotional complexity is taken as the definite score for each perspective in each scenario, irrespective of whether descriptions also cover information on other levels. Children's information in the descriptions is thus not scored on the complexity of the emotional experience defined in terms of a component process definition to emotion. So, Chapter 3 of this doctoral dissertation aimed to improve the validity evidence of the original LEAS-C and examine whether age differences can be revealed by (1) changing the instructions from *feel* to *experience* and explicitly instructing children to attend to all emotion components, and (2) applying a scoring procedure that takes the different emotion components that are represented in the descriptions into account. More specifically, the original scoring procedure and a new componential scoring procedure are applied, and validity evidence is for both scoring procedures collected by testing the internal structure, studying a broad network of convergent and discriminant relationships, and investigating gender and age differences in a substantially large sample of children and adolescents with a broad age range.

Mayer-Salovey-Caruso Emotional Intelligence Test – Youth Version

The MSCEIT-YV is the child version of the MSCEIT, the most widely used omnibus test of the four-branch emotional intelligence model. Although the overarching framework for the youth and adult versions of the MSCEIT is identical, the tasks and the scoring procedure are different. While the MSCEIT consists of two separate, but related tasks per branch, the MSCEIT-YV consists of a single task per branch. The ability of perceiving emotions (32 items) is measured by eight faces. For each face, children have to rate to which extent four different emotions are present in the face. The ability of facilitating thoughts (24 items) is measured via six synesthesia assignments. For each assignment, children have to rate to which extent an emotion feels like four different sensations or to which extent a combination of sensations feels like four different

emotions. The ability of understanding emotions (23 items) is measured by a series of multiple choice items on emotion definitions (i.e., combining correct emotion terms with feeling descriptions), emotion transitions and changes (i.e., detecting emotions that arise from particular event descriptions), and emotion blends (i.e., selecting combinations of emotions that correspond to emotional state descriptions). Children have to select the best suited answer out of four or five options. The ability of managing emotions (18 items) is measured through six stories. For each story, children have to rate to which extent three actions would be helpful in attaining the given emotional state. Furthermore, while the MSCEIT provides an expert scoring procedure and a consensus scoring procedure, the MSCEIT-YV is scored by a procedure that is predominantly based on adult criteria that combine theoretical criteria, research findings, and expert judgements. This strategy was taken because the most frequently endorsed answers for a wide diversity of items were 'clearly' not the best suited answers. So, a consensus scoring key was not considered feasible (Papadogiannis, Logan, & Sitarenios, 2009). The scoring of the MSCEIT-YV results in four branch scores and a total emotional intelligence score.

At the start of this doctoral dissertation, empirical evidence was restricted to the study of Peters, Kranzler, and Rossen (2009). This study was performed in a sample of 50 children between the ages of 10 and 18 and described first validity evidence of the MSCEIT-YV. A good reliability was observed for the total emotional intelligence scores. Emotional intelligence was related to coping ability (task-oriented coping, emotion-oriented coping, avoidance coping, distraction, and social diversion), general cognitive ability (general intellectual ability, reading ability, and math ability), academic achievement (reading achievement and math achievement), deviant behavior (discipline referrals), and self-reported emotional intelligence. Perceiving emotions, facilitating thoughts, understanding emotions and overall emotional intelligence showed moderate negative correlations with discipline referrals and moderate positive correlations with reading achievement and reading ability. Perceiving emotions, understanding emotions, and overall emotional intelligence revealed moderate negative correlations with emotion-oriented coping and moderate positive correlations with general intellectual ability. Moreover, only understanding emotions and overall emotional intelligence showed moderate positive correlations with math achievement. Furthermore,

relationships were compared between the MSCEIT-YV and the youth version of the EQ:I (EQ:I-YV; Bar-On & Parker, 2000) with external criteria without and with controlling for general cognitive ability. Moderate positive correlations were found between the MSCEIT-YV scores and the EQ:I-YV scores, supporting that both measure two different emotional intelligence constructs. In general, the MSCEIT-YV outperformed the EQ:I-YV in predicting the external criteria. Finally, significant positive correlations were found between age and facilitating thoughts, understanding emotions, managing emotions, and overall emotional intelligence.

A first area of concern for the MSCEIT-YV is related to the applicability of the scoring procedure that is mainly based on adult criteria by combining expert judgements, research findings and theoretical criteria. It may be questioned whether adult criteria can be used to evaluate the correctness of responses to emotion-related questions for children and adolescents. Therefore, Chapter 4 of this doctoral dissertation focuses on the comparability of the cognitive representation of the emotion domain between children and adolescents on one hand and students and adults on the other hand. In a first free listing study, a representative set of emotion terms is identified. Furthermore, it is investigated how the emotion vocabulary develops from childhood into adolescence. A second similarity rating study is focused on the dimensional structure of perceived similarities between emotion terms. Here, it is investigated whether children and adolescents evaluate emotion terms the same way as students and adults do, that is, according to the emotion dimensions of valence, power, arousal and novelty. The results of these studies can make important contributions to the emotion domain because these studies take several pitfalls and methodological considerations of prior research on the emotion lexicon and the dimensional emotion structure into account. The results of these studies can also make important contributions to the emotional intelligence domain as these studies deal with how people represent emotions. Emotion terms embody the whole emotional experience and are also those terms that are central to the MSCEIT-YV because virtually every item makes use of emotion terms. If similar emotion terms are reported by children and adolescents than those commonly used in adult research and children and adolescents evaluate emotion terms the same way as adults do, it would be justified to use adult criteria to decide on the correctness of responses to emotion-related questions. Furthermore, the results of these studies

(frequencies of emotion terms and distances among emotion terms) can also form a solid base for the development of additional items for the following MSCEIT-YV study.

A second area of concern for the MSCEIT-YV is embedded in the broader debate that variation in the scores yielded by the current scoring procedures cannot be clearly linked to variation in true emotional intelligence. It can be investigated whether raw responses of rating-based ability emotional intelligence tests allow to directly identify emotional intelligence without further transformations. So, Chapter 5 of this doctoral dissertation aims to examine and generalize the structure of raw responses at item level of the rating-based ability MSCEIT-YV tests. Moreover, because the study of Peters et al. (2009) was limited in scope due to the small sample, the absence of information on the internal structure, and the inclusion of a limited breadth of correlates, this chapter aims to extend the preliminary validity evidence of the MSCEIT-YV by additionally testing the internal structure, investigating a much broader network of convergent and discriminant relationships, and studying gender and age differences. It is thus tested whether emotional intelligence as measured in raw responses meets the conceptual, correlational, and developmental criteria that have been put forward to treat emotional intelligence as a legitimate form of intelligence. A first study deals with the rating-based MSCEIT-YV tests for perceiving emotions, facilitating thoughts, and managing emotions. A second study further examines the generalizability of the results and looks additionally at a rating version of the MSCEIT-YV understanding test and additional sets of items for perceiving emotions, facilitating thoughts, and managing emotions.

OUTLINE OF DISSERTATION

Because research from the ability model approach to emotional intelligence has mainly focused on the value of maximum performance measures in adults, the present dissertation aims to examine and improve the validity of two state-of-the-art maximum performance measures in children and adolescents, namely the LEAS-C and the MSCEIT-YV. To this end, six empirical studies are conducted to answer four general research questions (see Table 1). These studies are presented in the next four chapters.

Table 1

Overview of Research Questions Broken Down by the Maximum Performance Emotional Intelligence Test of Interest and Focus on Validation and Adaptation

	Maximum Performance Emotional Intelligence Test	
	LEAS-C (structure - complexity)	MSCEIT-YV (content - correctness)
<i>Validation</i>	Research question 1: Is the original LEAS-C a valid measure to assess emotional awareness? (Chapter 2, one study)	Research question 3: Do children and adolescents represent emotions the same way as students and adults do? (Chapter 4, two studies)
<i>Adaptation</i>	Research question 2: Can the validity of the original LEAS-C be improved by redesigning the instructions and the scoring procedure based on the componential emotion approach? (Chapter 3, one study)	Research question 4: Does a scoring directly based on the raw responses of rating-based ability MSCEIT-YV tests confirms the conceptual, correlational, and developmental criteria that are used to decide on emotional intelligence as a standard intelligence? (Chapter 5, two studies)

In **Chapter 2**, it is examined whether the original LEAS-C is a valid measure to assess emotional awareness in children and adolescents. A first explanation for why age differences in emotional awareness have not been found in the initial validation study of Bajgar et al. (2005), is that the sample was too small and the age range was too restricted. Therefore, the study in this chapter aims to extend existing validity evidence and test age differences in emotional awareness in a larger sample with a broader age range.

In **Chapter 3**, it is examined whether the validity of the original LEAS-C can be improved if the instructions and the scoring procedure are adapted on the basis of the componential emotion approach (Scherer, 2005). A second explanation for why age differences in emotional awareness have not been found

in the initial validation study of Bajgar et al. (2005), is related to the LEAS-C assessment itself. The instructions and scoring procedure are mainly focused on feelings while contemporary emotion psychology acknowledges the importance of different emotion components (i.e., appraisal, action tendency, bodily reaction, expression, and feeling). Consequently, the study in this chapter aims to examine the validity of an adapted LEAS-C that is focused on these different emotion components and test age differences in emotional awareness in a large sample with a broad age range.

In **Chapter 5**, it is examined whether a scoring that is directly based on the raw responses of rating-based ability MSCEIT-YV tests confirms the conceptual, correlational, and developmental criteria that are used to consider emotional intelligence as a standard intelligence. Research on the MSCEIT has caused considerable confusion on the status of emotional intelligence as standard intelligence because it has been suggested that the application of current scoring procedures does not allow to clearly link variation in scores to variation in true emotional intelligence. Therefore, the research in this chapter investigates the structure of raw responses of rating-based ability emotional intelligence tests and its implications for the conceptual, correlational, and developmental criteria that have been put forward to decide on emotional intelligence as an intelligence. A first study is focused on the three rating-based MSCEIT-YV tests. A second study is additionally focused on an adapted multiple choice test of the MSCEIT-YV and additional sets of items for each of the other three rating-based MSCEIT-YV tests.

In **Chapter 6**, the results of the studies in this dissertation are summarized and the research questions are answered. Moreover, strengths and limitations are discussed and directions for future research are proposed. We close by a general conclusion.

REFERENCES

- Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin*, 121, 219-245. doi:10.1037//0033-2909.121.2.219
- Bajgar, J., Ciarrochi, J., Lane, R. D., & Deane, F. (2005) Development of the Levels of Emotional Awareness Scale for Children (LEAS-C). *British Journal of Developmental Psychology*, 23, 569-586. doi:10.1348/026151005X35417
- Bänziger, T., Grandjean, D., & Scherer, K. R. (2009). Emotion recognition from expressions in face, voice, and body: The Multimodal Emotion Recognition Test (MERT). *Emotion*, 9, 691-704. doi:10.1037/a0017088
- Barchard, K. A. (2003). Does emotional intelligence assist in the prediction of academic success? *Educational and Psychological Measurement*, 63, 840-858. doi:10.1177/0013164403251333
- Barchard, K. A., Bajgar, J., Leaf, D. E., & Lane, R. D. (2010). Computer scoring of the Levels of Emotional Awareness Scale. *Behavior Research Methods*, 42, 586-595. doi:10.3758/BRM.42.2.586
- Bar-On, R. (1988). *The development of an operational concept of psychological well-being* (Unpublished doctoral dissertation). Rhodes University, South Africa.
- Bar-On, R. (1997). *The Emotional Quotient Inventory (EQ-i): Technical manual*. Toronto, Canada: Multi-Health Systems.
- Bar-On, R., & Parker, J. D. A. (2000). *The Bar-On Emotional Quotient Inventory: Youth Version (EQ-i:YV) Technical Manual*. Toronto, Canada: Multi-Health Systems.
- Beasley, K. (1987). The Emotional Quotient. *Mensa: The British Mensa Magazine*. Wolverhampton, United Kingdom: The British Mensa Society.
- Beaupré, M. G., Cheung, N., & Hess, U. (2000). *The Montreal Set of Facial Displays of Emotion [Slides]*. (Available from Ursula Hess, Department of Psychology, University of Quebec at Montreal, P.O. Box 8888, Station "Centre-ville," Montreal, Quebec H3C 3P8.).
- Boyatzis, R. E., Goleman, D., & Rhee, K. (2000). Clustering competence in emotional intelligence: Insights from the Emotional Competence Inventory

- (ECI). In R. Bar-On and J. D. A. Parker (eds.), *Handbook of emotional intelligence* (pp. 343-362). San Francisco: Jossey-Bass.
- Boyatzis, R. E., & Sala, F. (2004). The Emotional Competence Inventory (ECI). In G. Geher (Ed.), *Measuring emotional intelligence: Common ground and controversy* (pp.147-180). Hauppauge, NY: Novas Science.
- Brackett, M., Rivers, S., Shiffman, S., Lerner, N., & Salovey, P. (2006). Relating emotional abilities to social functioning: A comparison of self-report and performance measures of emotional intelligence. *Journal of Personality and Social Psychology*, 91, 780-795. doi:10.1037/0022-3514.91.4.780
- Brody, N. (2004). What cognitive intelligence is and what emotional intelligence is not. *Psychological Inquiry*, 15, 234-238. doi:10.1207/s15327965pli1503_03
- Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor analytic studies*. New York: Cambridge University Press.
- Côté, S., & Miners, C. T. H. (2006). Emotional intelligence, cognitive intelligence, and job performance. *Administrative Science Quarterly*, 51, 1-28. doi:10.2189/asqu.51.1.1
- Conte, J. M. (2005). A review and critique of emotional intelligence measures. *Journal of Organizational Behavior*, 26, 433-440. doi:10.1002/job.319
- Cronbach, L. J. (1949). *Essentials of psychological testing*. New York: Halpern.
- Damasio, A. (1994). *Descartes' error: Emotions, reason, and the human brain*. New York: Avon Books.
- Davies, M., Stankov, L., & Roberts, R. D. (1998). Emotional intelligence: In search of an elusive construct. *Journal of Personality and Social Psychology*, 75, 989-1015. doi:10.1037//0022-3514.75.4.989
- Day, A. L., & Carroll, S. A. (2008). Faking emotional intelligence (EI): Comparing response distortion on ability and trait-based EI measures. *Journal of Organizational Behavior*, 29, 761-784. doi:10.1002/job.485
- Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment: Implications for health, education, and the workplace. *Psychological Science in the Public Interest*, 5, 69-106. doi:10.1111/j.1529-1006.2004.00018.x
- Dyer, M. G. (1983). The role of affect in narratives. *Cognitive Science*, 7, 211-242. doi:10.1207/s15516709cog0703_3

- Farrelly, D., & Austin, E. J. (2007). Ability EI as an intelligence? Associations of the MSCEIT with performance on emotion processing and social tasks and with cognitive ability. *Cognition and Emotion*, 21, 1043-1063. doi:10.1080/02699930601069404
- Gardner, H. (1983). *Frames of mind*. New York: Basic Books.
- Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st century*. New York: Basic Books.
- Goleman, D. (1995). *Emotional intelligence*. New York: Bantam Books.
- Goleman, D. (1998). *Working with emotional intelligence*. New York: Bantam Books.
- Grubb, W. L., & McDaniel, M. A. (2007). The fakability of Bar-On's Emotional Quotient Inventory Short Form: Catch me if you can. *Human Performance*, 20, 43-59. doi:10.1080/08959280709336928
- Hemmati, T., Mills, J. F., & Kroner, D. G. (2004). The validity of the Bar-On Emotional Intelligence Quotient in an offender population. *Personality and Individual Differences*, 37, 695-706. doi:10.1016/j.paid.2003.10.003
- Hofstee, W. K. B. (2001). Personality and intelligence: Do they mix? In J. M. Collis & S. Messick (Eds.), *Intelligence and personality: Bridging the gap in theory and measurement* (pp. 43-60). England: Plymouth.
- Joseph, D. L., & Newman, D. A. (2010a). Discriminant validity of self-reported emotional intelligence: A multitrait-multisource study. *Educational and Psychological Measurement*, 70, 672-694. doi:10.1177/0013164409355700
- Joseph, D. L., & Newman, D. A. (2010b). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology*, 95, 54-78. doi:10.1037/a0017286
- Landy, F. J. (2005). Some historical and scientific issues related to research on emotional intelligence. *Journal of Organizational Behavior*, 26, 411-424. doi:10.1002/job.317
- Lane, R. D. (2000). Levels of emotional awareness: Neurological, psychological and social perspectives. In R. Bar-On & J. D. A. Parker (Eds.), *Handbook of emotional intelligence* (pp. 171-191). San Francisco: Jossey-Bass.
- Lane, R. D., & Pollermann, B. Z. (2002). Complexity of emotion representations. In L. F. Barrett & P. Salovey (Eds.), *The wisdom in feeling: Psychological processes in emotional intelligence. Emotions and social behavior* (pp.

- 271-293). New York, NY: Guilford Press.
- Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *American Journal of Psychiatry*, 144, 133-143. doi:10.1176/ajp.144.2.133
- Lane, R. D., Sechrest, L., Riedel, R., Weldon, V., Kaszniak, A., & Schwartz, G. E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. *Psychosomatic Medicine*, 58, 203-210.
- Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The Levels of Emotional Awareness Scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment*, 55, 124-134. doi:10.1080/00223891.1990.9674052
- Leuner, B. (1966). Emotional intelligence and emancipation. *Praxis der Kinderpsychologie und Kinderpsychiatrie*, 15, 193-203.
- Lopes, P. N., Brackett, M. A., Nezlek, J., Schütz, A., Sellin, I., & Salovey, P. (2004). Emotional intelligence and social interaction. *Personality and Social Psychology Bulletin*, 30, 1018-1034. doi:10.1177/0146167204264762
- MacCann, C., Matthews, G., Zeidner, M., & Roberts, R. D. (2003). Psychological assessment of emotional intelligence: A review of self-report and performance-based testing. *International Journal of Organizational Analysis*, 11, 247-274. doi: 10.1108/eb028975
- Marlowe, H. A. (1986). Social intelligence: Evidence for multidimensionality and construct independence. *Journal of Educational Psychology*, 78, 52-58. doi:10.1037/0022-0663.78.1.52
- Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Personality and Individual Differences*, 49, 554-564. doi:10.1016/j.paid.2010.05.029
- Matsumoto, D., LeRoux, J., Wilson-Cohn, C., Raroque, J., Kookan, K., Ekman, P., ... Goh, A. (2000). A new test to measure emotion recognition ability: Matsumoto and Ekman's Japanese and Caucasian Brief Affect Recognition Test (JACBART). *Journal of Nonverbal Behavior*, 24, 179-209. doi:10.1023/A:1006668120583
- Matthews, G., Zeidner, M., & Roberts, R. D. (2002). *Emotional intelligence: Science and myth*. Cambridge, MA: MIT Press.

- Matthews, G., Zeidner, M., & Roberts, R. D. (2004). Seven myths about emotional intelligence. *Psychological Inquiry*, 15, 179-196. doi:10.1207/s15327965pli1503_01
- Matthews, G., Zeidner, M., & Roberts, R. D. (Eds.). (2007). *The science of emotional intelligence: Knowns and unknowns*. New York: Oxford University Press.
- Matthews, G., Zeidner, M., & Roberts, R. D. (2012). *Emotional intelligence 101*. New York: Springer.
- Maul, A. (2012a). The validity of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) as a measure of emotional intelligence. *Emotion Review*, 4, 394-402. doi:10.1177/1754073912445811
- Maul, A. (2012b). Higher standards of validity evidence are needed in the measurement of emotional intelligence. *Emotion Review*, 4, 411-412. doi:10.1177/1754073912446357
- Mayer, J. D. (1986). How mood influences cognition. In N. E. Sharkey (Ed.), *Advances in cognitive science* (pp. 290–314). Chichester, West Sussex: Ellis Horwood.
- Mayer, J. D. (2001). A field guide to emotional intelligence. In J. Ciarrochi, J. P. Forgas, & J. D. Mayer (Eds.), *Emotional intelligence and everyday life* (pp. 3-24). New York: Psychology Press.
- Mayer, J. D., Caruso, D. R., & Salovey, P. (2000). Emotional intelligence meets traditional standards for an intelligence. *Intelligence*, 27, 267-298. doi:10.1016/S0160-2896(99)00016-1
- Mayer, J. D. & Geher, G. (1996). Emotional intelligence and the identification of emotion. *Intelligence*, 22, 89-113. doi:10.1016/S0160-2896(96)90011-2
- Mayer, J. D., Roberts, R. D., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, 59, 507-536. doi:10.1146/annurev.psych.59.103006.093646
- Mayer, J. D., & Salovey, P. (1993). The intelligence of emotional intelligence. *Intelligence*, 17, 433-442. doi: 10.1016/0160-2896(93)90010-3
- Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. J. Sluyter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3-34). New York: Basic Books.

- Mayer, J. D., Salovey, P., & Caruso, D. R. (2000). Models of emotional intelligence. In R. J. Sternberg (Ed.), *Handbook of intelligence* (pp. 396-420). New York, NY: Cambridge University Press.
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2002). *The Mayer, Salovey, and Caruso Emotional Intelligence Test: Technical manual*. Toronto: Multi-Health Systems.
- Mayer, J. D., Salovey, P., Caruso, D. R. (2012) The validity of the MSCEIT: Additional analyses and evidence. *Emotion Review*, 4, 403-408. doi:10.1177/1754073912445815
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2015). *Mayer-Salovey-Caruso Emotional Intelligence Test: YRV Researcher's guide*. Toronto: Multi-Health Systems.
- Mulligan, K., & Scherer, K. R. (2012). Toward a working definition of emotion. *Emotion Review*, 4, 345-357. doi:10.1177/1754073912445818
- Nelis, D., Quoidbach, J., Mikolajczak, M., & Hansenne, M. (2009). Increasing emotional intelligence: (How) is it possible? *Personality and Individual Differences*, 47, 36-41. doi:10.1016/j.paid.2009.01.046
- Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., & Mikolajczak, M. (2011). Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. *Emotion*, 11, 354-366. doi:10.1037/a0021554
- Nowicki, S., Jr., & Duke, M. P. (1994). Individual differences in the nonverbal communication of affect: The diagnostic analysis of nonverbal accuracy scale. *Journal of Nonverbal Behavior*, 19, 9-35. doi:10.1007/BF02169077
- O'Connor, R. M., & Little, I. S. (2003). Revisiting the predictive validity of emotional intelligence: Self-report versus ability-based measures. *Personality and Individual Differences*, 35, 1893-1902. doi:10.1016/S0191-8869(03)00038-2
- Papadogiannis, P. K., Logan, D., & Sitarenios, G. (2009). An ability model of emotional intelligence: A rationale, description, and application of the Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT). In C. Stough, D. H. Saklofske, & J. D. A. Parker (Eds), *Assessing emotional intelligence: Theory, research, and applications* (pp. 43-65). New York, NY: Springer.

- Paulhus, D. L., Lysy, D. C., & Yik, M. S. M. (1998). Self-report measures of intelligence: Are they useful as proxy IQ tests? *Journal of Personality*, 66, 525-554. doi:10.1111/1467-6494.00023
- Payne, W. L. (1986). A study of emotion: Developing emotional intelligence, self-integration, relating to fear, pain and desire. *Dissertation Abstracts International*, 47, (01), p. 203A. (University Microfilms No. AAC 8605928).
- Pérez, J. C., Petrides, K. V., & Furnham, A. (2005). Measuring trait emotional intelligence. In R. Schulze & R. D. Roberts (Eds.), *Emotional intelligence: An international handbook* (pp. 181-201). Cambridge, MA: Hogrefe & Huber.
- Peters, C., Kranzler, J. H., & Rossen, E. (2009). Validity of the Mayer-Salovey-Caruso Emotional Intelligence Test: Youth Version-Research Edition. *Canadian Journal of School Psychology*, 24, 76-82. doi:10.1177/0829573508329822
- Petrides, K. V., & Furnham, A. (2000a). On the dimensional structure of emotional intelligence. *Personality and Individual Differences*, 29, 313-320. doi:10.1016/S0191-8869(99)00195-6
- Petrides, K. V., & Furnham, A. (2000b). Gender differences in measured and self-estimated trait emotional intelligence. *Sex Roles*, 42, 449-461. doi:10.1023/A:1007006523133
- Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality*, 15, 425-448. doi:10.1002/per.416
- Petrides, K. V., & Furnham, A. (2003). Trait emotional intelligence: Behavioural validation in two studies of emotion recognition and reactivity to mood induction. *European Journal of Personality*, 17, 39-57. doi:10.1002/per.466
- Petrides, K. V., & Furnham, A. (2006). The role of trait emotional intelligence in a gender-specific model of organizational variables. *Journal of Applied Social Psychology*, 36, 552-569. doi:10.1111/j.0021-9029.2006.00019.x
- Rivers, S. E., Brackett, M. A., Salovey, P., & Mayer, J. D. (2007). Measuring emotional intelligence as a set of mental abilities. In G. Matthews, M. Zeidner, & R. D. Roberts (Eds.), *The science of emotional intelligence: Knowns and unknowns* (pp. 230-257). New York: Oxford University Press.

- Roberts, R. D., Matthews, G., & Zeidner, M. (2010). Emotional intelligence: Muddling through theory and measurement. *Industrial and Organizational Psychology*, 3, 140-144. doi:10.1111/j.1754-9434.2010.01214.x
- Roberts, R. D., Schulze, R., & MacCann, C. (2008). The measurement of emotional intelligence: A decade of progress? In G. Boyle, G. Matthews, & D. Saklofske (Eds.). *The SAGE handbook of personality theory and assessment* (pp. 461-482). New York: Sage.
- Roberts, R. D., Schulze, R., O'Brien, K., MacCann, C., Reid, J., & Maul, A. (2006). Exploring the validity of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) with established emotions measures. *Emotion*, 6, 663-669. doi:10.1037/1528-3542.6.4.663
- Roberts, R. D., Zeidner, M., & Matthews, G. (2001). Does emotional intelligence meet traditional standards for an intelligence? Some new data and conclusions. *Emotion*, 1, 196-231. doi:10.1037//1528-3542.1.3.196
- Rosenthal, R., Hall, J. A., DiMatteo, M. R., Rogers, P. L., & Archer, D. (1979). *Sensitivity to Nonverbal Communications: The PONS Test*. Baltimore, MD: The Johns Hopkins University Press.
- Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, 9, 185-211. doi:0.2190/DUGG-P24E-52WK-6CDG
- Salovey, P., Mayer, J. D., Goldman, S. L., Turvey, C., & Palfai, T. P. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the Trait Meta-Mood Scale. In J. W. Pennebaker (Ed.), *Emotion, disclosure, and health* (pp. 125-154). Washington: American Psychological Association.
- Salovey, P., Woolery, A., & Mayer, J. D. (2001). Emotional intelligence: conceptualization and measurement. In G. Fletcher & M. Clark (Eds.), *The Blackwell handbook of social psychology* (pp. 279-307). London: Blackwell.
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44, 693-727. doi:10.1177/0539018405058216
- Scherer, K. R., & Scherer, U. (2011). Assessing the ability to recognize facial and vocal expressions of emotion: Construction and validation of the Emotion Recognition Index. *Journal of Nonverbal Behavior*, 35, 305-326. doi:10.1007/s10919-011-0115-4

- Schlegel, K., Grandjean, D., & Scherer, K. R. (2014). Introducing the Geneva Emotion Recognition Test: An example of Rasch-based test development. *Psychological Assessment*, 26, 666-672. doi:10.1037/a0035246
- Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J., Dornheim, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences*, 25, 167-177. doi:10.1016/S0191-8869(98)00001-4
- Ten Houten, W. D., Hoppe, K. D., Bagen, J. E., & Walter, D. O. (1986). Alexithymia: An experimental study of cerebral commissurotomy patients and normal control subjects. *American Journal of Psychiatry*, 143, 312-316. doi:10.1176/ajp.143.3.312
- Thorndike, E. L. (1920). Intelligence and its uses. *Harper's Magazine*, 140, 227-235.
- Van Ghent, D. (1953). *The English novel: Form and function*. New York, NY: Harper & Row.
- Van Rooy, D. L., Viswesvaran, C., & Pluta, P. (2005). A meta-analytic evaluation of construct validity: What is this thing called emotional intelligence? *Human Performance*, 18, 445-462. doi:10.1207/s15327043hup1804_9
- Warwick, J., & Nettelbeck, T. (2004). Emotional intelligence is ...? *Personality and Individual Differences*, 37, 1091-1100. doi:10.1016/j.paid.2003.12.003
- Warwick, J., Nettelbeck, T., & Ward, L. (2010). AEIM: A new measure and method of scoring abilities-based emotional intelligence. *Personality and Individual Differences*, 48, 66-71. doi:10.1016/j.paid.2009.08.018
- Wechsler, D. (1940). Non-intellective factors in general intelligence. *Psychological Bulletin*, 37, 444-445.
- Wechsler, D. (1943). Non-intellective factors in general intelligence. *The Journal of Abnormal and Social Psychology*, 38, 101-103. doi:10.1037/h0060613
- Wechsler, D. (1958). *The measurement and appraisal of adult intelligence* (4th ed.). Baltimore, MD: Williams & Wilkins.
- Wilhelm, O. (2005). Measures of emotional intelligence: Practice and standards. In R. Schulze & R. D. Roberts (Eds.), *International handbook of emotional intelligence* (pp. 131-154). Seattle, WA: Hogrefe & Huber.
- Williams, C., Daley, D., Burnside, E., & Hammond-Rowley, S. (2010). Does item overlap account for the relationship between trait emotional intelligence and

psychopathology in preadolescents? *Personality and Individual Differences*, 48, 867-871. doi:10.1016/j.paid.2010.02.006

Wong, C. S., & Law, K. S. (2002). The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *Leadership Quarterly*, 13, 243-274. doi:10.1016/S1048-9843(02)00099-1

CHAPTER 2

The Assessment of Emotional Awareness in Children: Validation of the Levels of Emotional Awareness Scale for Children¹

Abstract

The Levels of Emotional Awareness Scale (LEAS) is a widely used scenario-based instrument that has been developed for the measurement of emotional awareness in adults. Although the LEAS has been validated in numerous studies, published validity research on the recently developed child version (LEAS-C) is scarce. The objective of the present study was to evaluate the construct validity of the Dutch LEAS-C in a sample of 318 children, aged 10 to 17 years. Outcomes revealed novel structural evidence in favor of alternative design-driven modeling. Further, the pattern of relationships with ability- and trait-oriented emotional intelligence, intelligence, personality, social and emotional impairment, and gender was generally consistent with previous theorizing and adult studies on the LEAS. Reasons for absence of age differences are discussed. In conclusion, this study corroborates the construct validity of the LEAS-C and highlights the importance of fully exploring the LEAS-C in its potential. Directions for future research are proposed.

¹ Veirman, E., Brouwers, S. A., & Fontaine, J. R. J. (2011). The assessment of emotional awareness in children: Validation of the Levels of Emotional Awareness Scale for Children, *European Journal of Psychological Assessment*, 27, 265-273. doi:10.1027/1015-5759/a000073

INTRODUCTION

Emotional awareness has been defined as the cognitive ability to identify and describe one's own emotional experiences and those of others (Lane & Schwartz, 1987). It is considered to be a central aspect of emotional intelligence because conscious processing of emotional information fosters adaptive emotional and intellectual growth (Lane, 2000). Awareness of emotions that might arise in a particular situation helps people to be prepared before the situation occurs, to adapt to that situation, and to deal with the possible consequences of the situation.

A commonly used measure of emotional awareness in adulthood is the Levels of Emotional Awareness Scale (LEAS). The LEAS is a written performance instrument in which adults have to imagine themselves in 20 fictional real-life scenarios and describe how they and other characters in those scenarios would feel. Descriptions are coded by an independent observer on the degree of complexity within the emotional representation. The distinguished levels of complexity range from representations without emotional content (e.g., cognitions), over representations focused on tangible emotion aspects (e.g., visceral or action-oriented), to representations with a balanced integration of more complex and inconsistent information (e.g., single emotions, blends of emotions, combined blends) in which emotional experiences of self and other are differentiated (Lane, Quinlan, Schwartz, Walker, & Zeitlin, 1990).

The most attractive feature of the LEAS is that it combines the strengths of the trait and the ability approach to emotional intelligence. Without asking respondents to rate their own level of emotional awareness, which is typical for the trait approach, the dispositional way to deal with emotional information is elicited by free responses in a representative set of everyday emotional scenarios. Moreover, without scoring for correctness, which is typical for the ability approach, the ability to represent emotional information is coded in the complexity of free responses (MacCann, Matthews, Zeidner, & Roberts, 2003). Thus, the LEAS assesses the dispositional complexity by which emotional information is represented.

Since its construction, cumulative evidence for the validity of the LEAS has been gathered. For example, the LEAS is positively related to the recognition of emotional stimuli (Lane et al., 1996). Also, brain studies have demonstrated a

positive relation between the quantity of blood flow in the anterior cingulate cortex and the LEAS during film- and recall-induced emotions (Lane et al., 1998). By consequence, the LEAS has gradually grown into an established addition to the literature on emotion psychology and has gained increasing value as a psychological assessment instrument that is used for several applied purposes. Lane and Schwartz (1992) have, for instance, proposed taking the levels of emotional awareness into account when selecting interventions (e.g., pharmacological, behavioral, cognitive, insight-oriented) in the treatment of depression. While medication and relaxation exercises are more appropriate at a low emotional awareness level (e.g., somatic complaints), insight-oriented counseling is more adequate at a high emotional awareness level (e.g., conflicting emotions).

Although most research on emotional awareness has been done with adults, recently, research has also looked at emotional awareness in childhood. Problems with adaptation to school and developmental lapses are expected to relate to problems in children's emotional awareness. For example, Izard et al. (2008) showed that training focused on increasing emotional awareness resulted in reduced aggression in 2- to 5-year-old children. With the growing interest in childhood a need for adequate assessment had emerged.

Bajgar, Ciarrochi, Lane, and Deane (2005) created a modified child version of the LEAS (or LEAS-C) with 12 real-life scenarios. Although the LEAS and the LEAS-C differ in the number and content of scenarios, the design and scoring procedure were kept similar, which guaranteed comparability and continuity between both instruments. Although a promising instrument, the validity of the LEAS-C has barely been examined. Bajgar et al. (2005) examined the validity of the LEAS-C themselves in a small ($N = 51$) sample of 10- and 11-year-old children with a limited breadth of correlates (cognitive development, emotion knowledge, and verbal intelligence). To date, no further studies are known.

The present paper reports on a validation study of the LEAS-C in a considerably larger sample ($N = 318$) that covers a wider age range (10 to 17 years). The internal structure and a broad network of convergent and discriminant relationships are investigated. Both aspects are considered to be of decisive importance in establishing the validity of a scale (Messick, 1989). As both design and scoring approach of the child and the adult version are analogous,

hypotheses are mainly based on previous theorizing and research with the adult version.

Internal structure

According to Lane and Schwartz (1987), the complexity of and the differentiation between self and other emotional representations in each of the scenarios are indicators of the emotional awareness construct. Thus far, only one study has investigated the factor structure of the LEAS among adults (Bydlowski et al., 2002). Separate exploratory factor analyses were applied on self, other, total, and joint self and other scores. Each time, evidence for a single predominant factor was found. The current study is the first to investigate the structure of the LEAS-C by means of confirmatory factor analyses (CFA). As in the study by Bydlowsky et al. (2002), fit of a one-factor structure was tested for the total scores². Then, four additional models were tested and compared for the self and other scores jointly. These models have been derived a priori from the design of the LEAS-C, which has two characteristics. First, the child has to describe self and other perspectives. So, a first issue is whether self and other representations are interchangeable, or whether they are distinct, albeit related, aspects of emotional awareness. According to Bydlowsky et al. (2002) they are interchangeable, but for example, Decety and Sommerville (2003) state that while self and other representations are not identical they do overlap to some degree. Second, each scenario generates a self and an other score. Thus, a second issue is whether the scenarios introduce shared method variance, which can be modeled by allowing residual correlations for the self and other scores of each scenario. As argued by Cole, Ciesla, and Steiger (2007), correlated residuals are justified if they are design-driven. Including residuals decreases undetectable misspecifications and the risk of identifying latent variables that do not represent the intended constructs. Consideration of both issues results in four a priori models, namely, (1) a one-factor model without correlated residuals, (2) a two-

² The total score is computed as the highest value of the self and the other score, possibly increased if there is a differentiation between self and other. Because total scores are dependent from self and other scores, no internal structure analysis can be executed on self, other, and total scores jointly.

factor model without correlated residuals, (3) a one-factor model with correlated residuals, and (4) a two-factor model with correlated residuals.

Network of convergent and discriminant relationships, gender, and age

Since emotional awareness is considered a part of emotional intelligence, and the LEAS-C integrates the trait and the ability approach to emotional intelligence, convergent validity was investigated with ability- and trait-oriented emotional intelligence in particular, and intelligence and personality in general. Discriminant validity was studied with social and emotional impairment. Moreover, gender and age differences were focused on.

Ability- and trait-oriented emotional intelligence

It was hypothesized that children who give a spontaneous, more complex representation of emotional information have a better understanding of emotion words and the emotion domain in general. Among adults, positive relations have been reported with perceiving emotions in stories, reasoning about and understanding emotions in the Multifactor Emotional Intelligence Scale (MEIS; Ciarrochi, Caputi, & Mayer, 2003), and understanding emotions in the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Lumley, Gustavson, Ty Partridge, & Labouvie-Vief, 2005). Furthermore, it may be expected that children who have a disposition to attend to emotions for intra- and interpersonal functioning will also develop more complex representations of emotional information. Research in adults with the Toronto Alexithymia Scale - 20 (TAS-20) reported negative correlations with externally-oriented thinking and overall alexithymia (e.g., Lane et al., 1996; Waller & Scheidt, 2004).

Intelligence and personality

Because describing one's own and other's feelings is a highly verbally loaded task, a positive relation with verbal intelligence is expected (see also Bajgar et al., 2005). Mayer, Roberts, and Barsade (2008) define emotional intelligence as an ability that works with and operates on emotional information, and thus, an integral part of the intelligence domain. This implies that emotional awareness should also relate to abstract reasoning, as is the case for other intelligence branches, which would highlight new convergent evidence. Of the Big Five

personality dimensions, openness is particularly relevant for emotional awareness. Next to imagination, esthetic sensitivity, and intellectual curiosity, this personality factor is characterized by attentiveness to inner feelings and emotional functioning (Costa & McCrae, 1992). It is expected that more open children develop more complex emotional representations. Using the NEO Personality Inventory - Revised (NEOPI-R), Ciarrochi et al. (2003) found a positive relation with openness in adults.

Social and emotional impairment

The study of social and emotional impairment is particularly important for demonstrating discriminant validity. The LEAS-C claims to assess the complexity and not the content of emotional representations. While the tendency to have negative emotional representations has been demonstrated to relate to psychopathology (e.g., Wright & Beck, 1983), the mere complexity should not show these relationships. In adults no correlations have been observed with mood and psychopathology scales of anxiety, stress, and depression (e.g., Ciarrochi, Scott, Deane, & Heaven, 2003).

Gender and age

There is a longstanding hypothesis that women are more emotional than men (Barrett, Lane, Sechrest, & Schwartz, 2000). It has repeatedly been found that women outperform men on particular facets of the emotion domain, including emotional complexity as measured by the LEAS-C (Bajgar et al., 2005), and the LEAS (e.g., Lane et al., 1996). At present, age differences were not found with the LEAS-C (Bajgar et al., 2005). The level of representational complexity, however, depends on the degree of past emotional language experience, which suggests that differences occur with increasing age (Lindquist & Feldman-Barrett, 2008). Children's representations evolve from an initial focus on the here and now to an internal mental world that is shared with other people. Adolescents, in turn, become more guided by norms and abstract ideals and their representations come to also rely on cultural and societal values. Adults develop even more complex representations (Labouvie-Vief, 2003). The results of Bajgar et al. (2005) could be explained by the restricted 2-year age range. With the 8-year age range in the current study, increasing emotional awareness was tested.

MATERIALS AND METHOD

Participants

A total of 318 Belgian children (47% males), aged 10 to 17 ($M_{\text{age}} = 13.30$, $SD_{\text{age}} = 1.80$), took part in the study. The sample of the Flemish school population was selected with respect to gender, age, and inclusion of primary school children and secondary school children over the different education levels. Eligibility for inclusion in the study was informed by an official report published by the Flemish Ministry of Education and Training. Only children who had Dutch as their first language were included.

Measures

Levels of Emotional Awareness Scale for Children (LEAS-C; Bajgar et al., 2005)

The LEAS-C can be used to assess emotional awareness from age 8 years and onward. In 12 scenarios participants are asked to report on two questions, i.e., “How would you feel?” and “How would the other person feel?” Each scenario is assigned three scores that reflect self, other, and overall emotional awareness. Self and other scores are independently determined on a 5-point scale ranging from 0 (*no answer and cognitions*), over 1 (*bodily sensations*), 2 (*actions and general emotional states*), 3 (*unidimensional emotions*), to 4 (*blends of emotions*). Total scores depend on the degree of differentiation between the emotional state of self and other. The total score is the highest score obtained for self or other score when no differentiation is made, but assigned a score of 5 when differentiation is clearly apparent (see Appendix 1 for an example scenario). The English LEAS-C was translated into Dutch by the first author, in collaboration with a departmental colleague³. The final version was decided upon by a committee of bilingual experts on emotions. Cronbach’s α s were .73 for self, .73 for other, and .76 for overall emotional awareness.

Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV; Mayer, Salovey, & Caruso, in press)

³ Original and translated versions of the LEAS-C are available at the website of the Illawarra Institute of Mental Health, University of Wollongong, Australia (<http://www.uow.edu.au/health/iimh/ResearchThemes/index.html>).

The MSCEIT-YV is a 101-item performance test of emotional intelligence that can be used from age 10 years and onward. Four branches, i.e., perceiving emotions, facilitating thoughts, understanding emotions, and managing emotions, and overall emotional intelligence are measured. Corresponding Cronbach's α s were respectively .65, .69, .53, and .63 at the branch level, and .75 at the overall level.

Alexithymia Questionnaire for Children (AQ-C; Rieffe, Oosterveld, & Meerum Terwoght, 2006)

The AQ-C, based on the TAS-20, is a 20-item self-report questionnaire of alexithymia in which difficulties in identifying feelings, difficulties in describing feelings, externally-oriented thinking, and overall alexithymia are assessed. It can be used from age 9 years and onward. Items are rated on a 3-point scale (1 = *not true* and 3 = *true*). Cronbach's α s were .73 for difficulties in identifying feelings, .70 for difficulties in describing feelings, .32 for externally-oriented thinking⁴, and .70 for overall alexithymia.

Wechsler Intelligence Scale for Children - Third Edition - NL (WISC-III-NL; Kort et al., 2005) and Raven's Standard Progressive Matrices (SPM; Raven, 1960)

The WISC-III and the SPM can be used to assess intelligence from age 6 years and onward. The WISC-III measures verbal and nonverbal ability through 13 subtests. Scoring leads to three main scores, i.e., verbal IQ, performance IQ, and total IQ. The SPM consists of 60 multiple choice items of abstract reasoning that are arranged in five different subsets that vary in difficulty. Cronbach's α for the SPM was .85.

Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999)

The HiPIC, based on the NEO-PI-R questionnaire, consists of 144 self-report items that represent the Big Five personality factors of neuroticism, extraversion, openness, agreeableness, and conscientiousness. It can be used from age 8 years and onward. Items are rated on a 5-point scale (1 = *uncharacteristic* and 5

⁴ Cronbach's α of externally-oriented thinking is low, though consistent with literature (Rieffe et al., 2006).

= *very characteristic*). Cronbach's α s were .34 for neuroticism⁵, .65 for extraversion, .66 for agreeableness, .81 for openness, and .82 for conscientiousness.

Beck Youth Inventories (BYI; Dillen, Fontaine, & Verhofstadt-Denève, 2009)

The BYI assess social and emotional impairment by way of five 20-item self-report inventories on self-concept, depression, anxiety, anger, and disruptive behaviors. They can be used from age 7 years and onward. Items are rated on a 4-point scale (0 = *never* to 3 = *always*). Corresponding Cronbach's α s were respectively .84, .88, .84, .88, and .81.

Procedure

Participation was based upon informed consent of both parents and their underage children. Parents of possible participants received a letter describing the study and its aims. Included in the letter was information that parents and participants were allowed to decline at any given time during the research. After permission, the measures were completed individually at home. The tests were administrated by trained research assistants. During the administration participants and research assistants were seated at a table facing one another. After participation, participants and their parents were debriefed and thanked.

RESULTS AND DISCUSSION

Internal structure

The factor structure of the LEAS-C was investigated with CFA using *Mplus* 4.1. (Muthén & Muthén, 1998-2006). Evaluation of the fit indices was based on guidelines provided by Schweizer (2010) according to which a good fit is indicated by $\chi^2/df < 2$, comparative fit index (CFI) $> .95$, root mean square error of approximation (RMSEA) $< .05$, and standardized root mean square residual (SRMR) $< .10$; and an acceptable fit is indicated by $\chi^2/df < 3$, CFI $> .90$, RMSEA $< .08$, and SRMR $< .10$. Furthermore, the Bayesian information criterion (BIC) was used to evaluate model parsimony. Lower BIC values indicate more parsimonious models (Kline, 2005, p. 143). The theoretically expected one-factor

⁵ Neuroticism α is unexpectedly low given the fair to good α s of the other scales in this study.

model for the total scores showed acceptable to good fit values. When the four a priori design-driven models were applied and compared on self and other scores jointly, only the two-factor model with scenario residual correlations showed acceptable to good fit and moreover had the lowest BIC value. For the other three models, at least one fit value pointed to unacceptable fit (see Table 1).

The present study is the first to apply CFA to a LEAS instrument, be it the child or adult version. The results are clear-cut for the child version. The total score, which is mostly used for assessment, fits the a priori one-factor structure. Thus, summing total scores across the 12 scenarios is justified (see Table 2 for standardized factor loadings). Analyses on self and other scores jointly, however, call for refinement into a hierarchically organized construct with self and other emotional awareness as two highly related, but distinct factors, a finding that is in line with developmental, social, and neuropsychological evidence (e.g., Decety & Sommerville, 2003). Though an overall score is still justified because self and other scores are highly correlated, our results also revealed nonshared variance. Furthermore, the finding that scenario correlated residuals had to be included demonstrated the presence of shared method variance. Children are influenced by the specific content of the scenarios. Two scenarios, namely “crash during lunchtime” and “getting picked for the team” shared especially high method variance (see Table 2 for standardized factor loadings and residual correlations).

Table 1

Comparison of Fit Indices of Various Models Regarding the Structure of the LEAS-C Obtained by Confirmatory Factor Analyses (Maximum Likelihood)

Model	χ^2	<i>df</i>	χ^2/df	SRMR	RMSEA	CFI	BIC
Theoretical							
One-factor total	102.23	54	1.89	.05	.05	.91	9107.56
Design-driven							
One-factor self + other no correlated residuals	888.27	252	3.52	.07	.09	.61	20599.85
Two-factor self + other no correlated residuals	871.93	251	3.47	.07	.09	.61	20586.10
One-factor self + other correlated residuals	414.29	240	1.73	.05	.05	.89	20156.95
Two-factor self + other correlated residuals	333.36	239	1.39	.05	.04	.94	20078.61

Note. *df* = degrees of freedom; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CFI = comparative fit index; BIC = Bayesian information criterion.

Table 2

Standardized Parameter Estimates for the Total Model and the Final Model on Self and Other Scores Jointly of the LEAS-C Obtained by Confirmatory Factor Analyses (Maximum Likelihood)

Scenario	One-factor	Two-factor		
	F _{total}	F _{self}	F _{other}	EC
1. Running a race (you-friend)	.47	.41	.40	.21**
2. Fire trucks at home (you-mum)	.45	.50	.47	.35**
3. Saving pocket money (you-friend)	.55	.49	.53	-.04
4. Nice words (you-person)	.53	.50	.52	.05
5. Death of pet (you-father)	.48	.46	.46	.19**
6. Crash during lunchtime (you-kid)	.36	.36	.43	.59**
7. Visiting the dentist (you-dentist)	.53	.52	.26	.11*
8. Unacceptable work (you-teacher)	.59	.55	.50	.08
9. Secrets (you-kid)	.53	.43	.51	.07
10. Getting picked for the team (you-kid)	.42	.41	.45	.56**
11. Sharing chips (you-friend)	.30	.30	.28	.17**
12. Visited after a while (you-friend)	.42	.41	.46	.28**

Note. F_{total}: Factor loadings of total scores on the identified Total factor (one-factor total model); F_{self}: Factor loadings of self scores on the first identified Self factor, F_{other}: Factor loadings of other scores on the second identified Other factor, and EC: Error covariance's (two-factor self + other model, correlated residuals). Correlation between F_{self} and F_{other} is .79.

* $p < .05$. ** $p < .01$.

Network of convergent and discriminant relationships, gender and age

Ability- and trait-oriented emotional intelligence

Pearson product moment correlations are presented in Table 3⁶. Emotional complexity shows a positive relation with overall emotional intelligence and further appears to relate to understanding and managing emotions, the most cognitively saturated parts of emotional intelligence⁷. Moreover, low emotional awareness tends to go together with an externally-oriented style of thinking, whereas no relation was found with difficulties in identifying and describing feelings. These findings are in line with prior evidence that suggests that the cognitive-attentional aspects of alexithymia are closely related to lack of

⁶ As commonly applied in research on the child and adult version, results are discussed against external criteria in terms of total scores. For convention, we presented correlations with self, other, and total scores in Table 3.

⁷ Cautious interpretation is warranted because the MSCEIT-YV is not yet released.

mentalized emotional experience, whereas the more affective facets of alexithymia relate rather to the amount of distress (Waller & Scheidt, 2004)⁸.

Intelligence and personality

Verbal aspects of intelligence are related to the LEAS-C. However, emotional awareness is not exclusively related to linguistic competence but also appeals to abstract thought, which supports new convergent evidence. In addition, emotional complexity is not related to visual-perceptual aspects of intelligence, which supports novel discriminant evidence. With relation to personality, more openness is, indeed, accompanied by a greater awareness of emotions. In addition, our results underline the importance of agreeableness and conscientiousness (see Table 3). Though we have no obvious explanation for agreeableness, conscientious children may have been more motivated to perform well on the quite extensive test battery. Further study will be required to unravel current findings.

Social and emotional impairment

Emotional complexity was not related to self-concept, depression, anxiety, anger, and disruptive behaviors (Table 3). These results provide discriminant evidence, which emphasizes the measurement of structure instead of content.

⁸ Distress as measured by the BYI was, indeed, low to moderately related with difficulties in identifying and describing feelings ($r_{\text{self-concept}}$: $-.17$ -. $.31$; $r_{\text{other subscales}}$: $.16$ -. $.53$), but not with externally-oriented thinking.

Table 3

Means (M) and Standard Deviations (SD) of External Criteria and Pearson Correlations (r) with LEAS-C

Scale	M	SD	r_{self}	r_{other}	r_{total}
Emotional Awareness					
LEAS-C – Self	30.94	5.98	-		
LEAS-C – Other	29.22	6.30	.65**	-	
LEAS-C – Total	34.85	5.49	.89**	.76**	-
Emotional Intelligence					
MSCEIT-YV – Perceiving emotions	95.70	13.92	.05	.06	.02
MSCEIT-YV – Facilitating thoughts	106.58	12.56	.07	.08	.08
MSCEIT-YV – Understanding emotions	101.84	8.80	.18**	.16**	.19**
MSCEIT-YV – Managing emotions	105.50	10.25	.12*	.16**	.13*
MSCEIT-YV – Total	104.62	9.31	.17**	.19**	.18**
Alexithymia					
AS-C – Identification	12.45	3.01	-.04	.02	.00
AS-C – Communication	9.31	2.41	-.07	.01	-.03
AS-C – Externally-oriented thinking	14.50	2.37	-.18**	-.12*	-.19**
AS-C – Total	36.26	5.48	-.13*	-.03	-.09
Intelligence					
WISC-III – Verbal IQ	105.92	14.90	.19**	.18**	.21**
WISC-III – Performance IQ	101.14	14.49	.06	.06	.10
WISC-III – Total IQ	104.28	14.78	.15**	.14*	.17**
SPM – Abstract reasoning	46.09	6.34	.18**	.21**	.18**
Personality					
HiPIC – Neuroticism	41.30	9.54	.08	.08	.09
HiPIC – Extraversion	110.09	14.12	.04	.01	.07
HiPIC – Openness	80.72	11.72	.12*	.09	.15**
HiPIC – Agreeableness	139.46	14.96	.14*	.08	.11*
HiPIC – Conscientiousness	101.23	15.08	.17**	.12*	.17**
Social and Emotional Impairment					
BYI – Self concept	35.96	7.01	.05	.06	.07
BYI – Depression	10.52	6.44	.03	.02	.07
BYI – Anxiety	14.31	6.76	-.07	-.03	-.03
BYI – Anger	11.80	6.69	-.02	-.09	.01
BYI – Disruptive behaviors	6.54	4.32	-.07	-.08	-.06

Note. LEAS-C: Levels of Emotional Awareness Scale for Children; MSCEIT-YV: Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version; AS-C: Alexithymia Scale for Children; WISC-III: Wechsler Intelligence Scale for Children Third Edition - NL; SPM: Standard Progressive Matrices; HiPIC: Hierarchical Personality Inventory for Children; BYI: Beck Youth Inventories.

* $p < .05$. ** $p < .01$.

Gender and age

Three ANCOVAs were executed to examine gender differences. Since verbal and written language performance is typically better in girls than in boys, we controlled for verbal ability (Burman, Bitan, & Booth, 2008). Girls outperformed boys on self, $F(1, 315) = 13.24, p < .001$; other, $F(1, 315) = 6.88, p < .01$; and total scores, $F(1, 315) = 10.45, p = .001$. Unexpectedly, bivariate correlations showed no relationship between age and self ($r = .01; p = .80$), other ($r = .00; p = .98$), and total scores ($r = .06; p = .26$). Although developmental research suggests that most 3-year-old children understand emotion words such as happy, mad, sad, and scared (e.g., Harter, 1982), it remains unlikely that linguistic emotional complexity is fully developed by the age of 10. As argued by Labouvie-Vief (2003), cognitive emotion schemata evolve from childhood, over adolescence, to adulthood from relatively automatic and simple representations to highly complex and integrated representations. Probably the current assessment approach is not capable of capturing higher developments of emotional awareness. The nature of scoring scheme offers a plausible explanation. Less (e.g., sad) and more complex (e.g., jealous) emotion terms are not distinguished in the score they are awarded and the degree of integration of various emotion characteristics within the emotional representations is not acknowledged. For instance, the word “anger” receives the same score as the phrase “I would feel angry because I was unjustly treated, I would want to hit this person and start to shout, and I would feel very hot.” In current emotion psychology, different emotion components such as bodily sensations, expressions, action tendencies, appraisals, subjective experiences, and regulation, are the hallmark of an emotion, and the recognition of interrelationships of emotion components signifies an awareness of the differences between states and situations (Scherer, 2005).

GENERAL DISCUSSION

The present study indicates that the LEAS-C provides a valuable assessment of emotional awareness in childhood. The tested models point to a clear-cut internal structure and nearly all hypotheses on the pattern of convergent and discriminant relationships were confirmed. However, it will be important to expand our validity evidence in future research.

Our findings have demonstrated that it is advisable to also address younger age groups to explore the development of emotional awareness in early childhood as measured by the LEAS-C. Further, we anticipate examining the stability of our novel structural evidence and the extent to which the LEAS-C is capable of visualizing differences between self and other emotional awareness. In-depth structural analyses and examination of internal (e.g., coping) and external oriented constructs (e.g., interpersonal functioning) in relation to self and other emotional awareness are desirable. Finally, since the magnitude of correlations we found was rather low, it is advisable to establish additional ties to the network of convergent and discriminant relationships. A particular concept of interest that is not restricted to the emotion domain is mentalizing (or theory of mind). Mentalizing constitutes of a self-reflective and an interpersonal function that distinguishes inner vs. outer, pretend vs. real, and intrapersonal vs. interpersonal aspects of reality, to predict human behavior, and to guide one's own and others' behaviors (Fonagy, Gergeley, Jurist, & Target, 2002). Further research could add valuable insight about how both concepts relate to each other.

Finally, the current study calls for meaningful adaptations of the LEAS-C that allow better discrimination at the upper side of the construct. Optimization of the scale construction could be obtained by selecting a reduced number of scenarios with low error covariances. Current scoring rules could be adapted to a more sophisticated scoring scheme.

Appendix 1

The 5 Levels of Emotional Awareness with Response Examples: LEAS-C Scenario #7. The dentist tells you that you have some problems with your teeth that need to be fixed immediately. The dentist makes an appointment for you to come back the next day. How would you feel? How would the dentist feel?

Level	Ability to describe emotions	Example of response
0	No response/cognitions	I would feel like I should have brushed my teeth more often than I did. The dentist would feel like I didn't brush my teeth enough.
1	Bodily sensation	I would feel it would hurt. I don't know how the dentist would feel.
2	Global hedonic state	I would feel alright because we had it done before. He would feel good.
3	Unidimensional emotion	We would both feel angry of course!
4	Differentiated emotions	I would feel scared. The dentist would probably feel worried and happy to fix me and get money.
5	More complex and differentiated states	I would feel a bit worried for my teeth but excited because I don't know what will happen. The dentist would feel hopeful and sorry.

Note. From Bajgar, J., Ciarrochi, J., Lane, R., & Deane, F. (2005). Development of the Levels of Emotional Awareness Scale for Children (LEAS-C). *British Journal of Developmental Psychology*, 23, 569-586. Reproduced with permission from the *British Journal of Developmental Psychology*, © The British Psychological Society.

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REFERENCES

- Bajgar, J., Ciarrochi, J., Lane, R. D., & Deane, F. (2005) Development of the Levels of Emotional Awareness Scale for Children (LEAS-C). *British Journal of Developmental Psychology*, 23, 569-586. doi:10.1348/026151005X35417
- Barrett, L. F., Lane, R. D., Sechrest, L., & Schwartz, G. E. (2000). Sex differences in emotional awareness. *Personality and Social Psychology Bulletin*, 26, 1027-1035. doi: 10.1177/01461672002611001
- Burman D. D., Bitan T., & Booth, J. R. (2008). Sex differences in neural processing of language among children. *Neuropsychologia*, 46, 1349-1362. doi:10.1016/j.neuropsychologia.2007.12.021
- Bydlowski, S., Corcos, M., Paterniti, S., Guilbaud, O., Jeammet, P., & Consoli, S. M. (2002). Validation de la version française de l'échelle des niveaux de conscience émotionnelle. *L'Encéphale*, 28, 310-320. doi :ENC-09-2002-28-4-0013-7006-101019-ART5
- Ciarrochi, J., Caputi, P., & Mayer, J. D. (2003). The distinctiveness and utility of a measure of trait emotional awareness. *Personality and Individual Differences*, 34, 1477-1490. doi:10.1016/S0191-8869(02)00129-0
- Ciarrochi, J., Scott, G., Deane, F. P., & Heaven, P. C. L. (2003). Relations between social and emotional competence and mental health: A construct validation study. *Personality and Individual Differences*, 35, 1947-1963. doi:10.1016/S0191-8869(03)00043-6
- Cole, D. A., Ciesla, J. A., & Steiger, J. H. (2007). The insidious effects of failing to include design-driven correlated residuals in latent-variable covariance structure analysis. *Psychological Methods*, 12, 381-398. doi:10.1037/1082-989X.12.4.381
- Costa, P. T., & McCrae, R. R. (1992). *NEO personality Inventory professional manual*. Odessa, FL: Psychological Assessment Resources.
- Decety, J., & Sommerville, J. A. (2003). Shared representations between self and other: A social cognitive neuroscience view. *Trends in Cognitive Sciences*, 7, 527-533. doi:10.1016/j.tics.2003.10.004
- Dillen, L., Fontaine, J. R. J., & Verhofstadt-Denève, L. (2009). Confirming the distinctiveness of complicated grief from depression and anxiety among

- adolescents. *Death Studies*, 33, 437-461. doi:10.1080/07481180902805673
- Fonagy, P., Gergeley, G., Jurist, E., & Target, M. (2002). *Affect regulation, mentalization, and the development of the self*. New York: Other Press.
- Harter, S. (1982). The perceived competence scale for children. *Child Development*, 53, 87-97. doi:10.2307/1129640
- Izard, C. E., King, K. A., Trentacosta, C. J., Laurenceau, J. P., Morgan, J. K., Krauthamer-Ewing, E. S., & Finlon, K. J. (2008). Accelerating the development of emotion competence in Head Start children: Effects on adaptive and maladaptive behavior, *Development and Psychopathology*, 20, 369-397. doi:10.1017/S0954579408000175
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.
- Kort, W., Schittekatte, M., Bosmans, M., Compaan, E. L., Dekker, P. H., Vermeir, G., & Verhaeghe, P. (2005). *WISC-III - NL: Wechsler Intelligence Scale for Children. Handleiding en verantwoording [Dutch manual]*. Amsterdam: Harcourt Test Publishers.
- Labouvie-Vief, G. (2003). Dynamic integration: Affect, cognition, and the self in adulthood. *Current Directions in Psychological Science*, 12, 201-206. doi:10.1046/j.0963-7214.2003.01262.x
- Lane, R. D. (2000). Levels of emotional awareness: Neurological, psychological and social perspectives. In R. Bar-On & J. D. A. Parker (Eds.), *Handbook of emotional intelligence* (pp. 171-191). San Francisco: Jossey-Bass.
- Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *American Journal of Psychiatry*, 144, 133-143. doi:10.1176/ajp.144.2.133
- Lane, R. D., & Schwartz, G. E. (1992). Levels of emotional awareness: Implications for psychotherapeutic integration. *Journal of Psychotherapy Integration*, 2, 1-18.
- Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The Levels of Emotional Awareness Scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment*, 55, 124-134. doi:10.1080/00223891.1990.9674052

- Lane, R. D., Reiman, E. M., Axelrod, B., Lang-Sheng, Y., Holmes, A., & Schwartz, G. E. (1998). Neural correlates of levels of emotional awareness: Evidence of an interaction between emotion and attention in the anterior cingulate cortex. *Journal of Cognitive Neuroscience*, 10, 525-535. doi:10.1162/089892998562924
- Lane, R. D., Sechrest, L., Riedel, R., Weldon, V., Kaszniak, A., & Schwartz, G. E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. *Psychosomatic Medicine*, 58, 203-210.
- Lindquist, K., & Barrett, L. F. (2008). Emotional complexity. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *The handbook of emotion* (3rd ed., pp. 513-530). New York: Guilford.
- Lumley, M. A., Gustavson, B. J., Ty Partridge, R., & Labouvie-Vief, G. (2005). Assessing alexithymia and related emotional ability constructs using multiple methods: Interrelationships among measures. *Emotion*, 5, 329-342. doi:10.1037/1528-3542.5.3.329
- MacCann, C., Matthews, G., Zeidner, M., & Roberts, R. D. (2003). Psychological assessment of emotional intelligence: A review of self-report and performance-based testing. *International Journal of Organizational Analysis*, 11, 247-274. doi:10.1108/eb028975
- Mayer, J. D., Roberts, R. D., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, 59, 507-536. doi:10.1146/annurev.psych.59.103006.093646
- Mayer, J. D., Salovey, P., & Caruso, D. (in press). *The Mayer-Salovey-Caruso Emotional Intelligence Test: Youth Version-Research Edition (MSCEIT-YV)*. Toronto: Multi-Health Systems.
- Mervielde, I., & De Fruyt, F. (1999). Construction of the Hierarchical Personality Inventory for Children. In I. Mervielde, I. J. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality psychology in Europe* (Vol. 7, pp. 107-127). Tilburg: University Press.
- Messick, S. (1989). Validity. In R. L. Linn (Ed.), *Educational measurement* (pp. 13-103). Washington, DC: American Council on Education and National Council on Measurement in Education.
- Muthén, L. K., & Muthén, B. O. (1998–2006). *Mplus user's guide* (4th ed.). Los Angeles: Authors.

- Raven, J. C. (1960). *Guide to the standard progressive matrices*. London: H. K. Lewis & Co.
- Rieffe, C., Oosterveld, P., & Terwogt, M. M. (2006). An alexithymia questionnaire for children: Factorial and concurrent validation results. *Personality and Individual Differences*, 40, 123-133. doi:10.1016/j.paid.2005.05.013
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44, 693-727. doi:10.1177/0539018405058216
- Schweizer, K. (2010). Some guidelines concerning the modeling of traits and abilities in test construction. *European Journal of Psychological Assessment*, 26, 1-2. doi:10.1027/1015-5759/a000001
- Waller, E., & Scheidt, C. E. (2004). Somatoform disorders as disorders of affect regulation. A study comparing the TAS-20 with non-self-report measures of alexithymia. *Journal of Psychosomatic Research*, 57, 239-247. doi:10.1016/S0022-3999(03)00613-5
- Wright, J. H., & Beck, A. T. (1983). Cognitive therapy of depression: Theory and practice. *Hospital and Community Psychiatry*, 34, 1119-1127. doi:10.1176/ps.34.12.1119

CHAPTER 3

Towards a Componential Emotion Approach for the Assessment of Emotional Awareness in Children and Adolescents¹

Abstract

The Levels of Emotional Awareness Scale for Children (LEAS-C) is a performance-based instrument that measures emotional awareness in the structure of written responses to a set of real-life scenarios. It has been believed that emotional awareness develops with age, yet, robust age differences have not yet been established with the LEAS-C. The present study investigated whether a componential emotion approach to the instructions and the scoring procedure improves the validity of the LEAS-C and reveals age differences. An adapted LEAS-C was administered to a sample of 574 children and adolescents aged 8 to 16 years and scored with the original scoring and a new componential scoring. An acceptable reliability for the original scoring and a good reliability and a high inter-rater reliability for the componential scoring were observed. Confirmatory factor analyses provided best fit for a one-factor model on total scores and a one-factor model on self and other scores for the componential scoring. The pattern of relationships with alexithymia, emotional intelligence, intelligence, personality, and social and emotional impairment, and gender differences were comparable to those found in prior research. The expected relationship with age was found, with stronger correlations for the componential scoring than the original scoring. In conclusion, this study supported the value of the componential emotion approach for the validity of the LEAS-C and showed age differences in emotional awareness.

¹ Veirman, E., & Fontaine, J. R. J. (manuscript in preparation). Towards a componential emotion approach for the assessment of emotional awareness in children and adolescents.

INTRODUCTION

Emotional awareness has been defined as the cognitive ability to identify and describe emotional experiences in oneself and others (Lane & Schwartz, 1987). It is intertwined with alexithymia, or the impaired capacity to construct mental representations of emotions (Lane et al., 1996). Furthermore, it is considered fundamental to emotional intelligence (Lane, 2000), because complex emotional information can be used to support higher level emotional processes such as using emotions to facilitate thoughts, understanding emotions and managing emotions (Barchard, Bajgar, Leaf, & Lane, 2010).

The construct of emotional awareness has been derived from the Levels of Emotional Awareness (LEA) model that incorporates Piaget's (Flavell, 1962) theory of cognitive development and Werner and Kaplan's (1963) theories of symbolization and language development (Lane & Schwartz, 1987). According to this model, emotional awareness is structured from cognitive schemata that people use to filter and process internal and external emotional information. Individual differences in the complexity (or the degree of integration and differentiation) of these schemata mirror people's past experience with emotion language (Bajgar, Ciarrochi, Lane, & Deane, 2005). Over the years, many studies using the Level of Emotional Awareness Scale (LEAS; Lane, Quinlan, Schwartz, Walker, & Zeitlin, 1990) provided cumulative evidence for the validity of this LEA model (e.g., Lane et al., 1996). Until now, only few studies used the child version of the LEAS (LEAS-C; Bajgar et al., 2005) to investigate the LEA model in children (Bajgar et al., 2005; Manchini, Agnoli, Trombini, Baldaro, & Surcinelli, 2013; Marchetti, Valle, Massaro, & Castelli, 2010; Veirman, Brouwers, & Fontaine, 2011). Although the development of emotional awareness is a fundamental tenet of the LEA model, these studies found (virtually) no age differences in emotional awareness.

Veirman et al. (2011) suggested that the lack of robust age differences in emotional awareness may be due to the central position of feelings in the LEAS-C assessment, while contemporary emotion psychology holds that multiple emotion components constitute an emotion (Scherer, 2005). Therefore, they called for adaptations to the LEAS-C assessment. The present research acted upon this call and investigated whether a componential emotion approach to the instructions and the scoring procedure of the LEAS-C improves the validity of the

original version of the LEAS-C and reveals age differences in a large sample of children and adolescents.

We begin with an overview of the LEAS-C and the existing validity evidence of this test. Then, the componential emotion approach is introduced and how it can help to overcome the limitations of the instructions and the scoring procedure of the original version of the LEAS-C. We end by presenting the current study.

LEAS-C measurement procedure and empirical evidence

The LEAS-C holds an appealing intermediate position between self-report and maximum performance emotional intelligence assessment. It is not a typical self-report test because children are not asked to evaluate their own level of emotional awareness, nor it is a standard maximum performance test because children are not asked to resolve a problem and responses are not scored on correctness. Instead, children are asked to describe how they (self-perspective) and others (other-perspective) would feel in a set of 12 real-life scenarios, what is assumed to elicit the dispositional way of dealing with emotional information. The ability to represent emotional information is for each scenario coded in three scores: a score for self-awareness, a score for other-awareness, and a score for total-awareness. These scores are meant to reflect the level of emotional complexity in children's descriptions. Cognitions (e.g., I would expect him to help me) are scored at Level 0, bodily sensations (e.g., I would feel a terrible pain in my head) or direct states of the lack of an emotional response (e.g., I would feel nothing) are scored at Level 1, actions (e.g., I would feel like smashing the wall) or general emotional states (e.g., I would feel bad) are scored at Level 2, single emotions (e.g., I would feel surprised) are scored at Level 3, blends of emotions (e.g., I would feel sadness and guilt at the same time) are scored at Level 4, and combinations of blends that are differentiated for the self and the other are scored at Level 5 (e.g., I would feel embarrassed and overwhelmed, my friend would feel relieved and happy) (Bajgar et al., 2005). The self- and the other-awareness score range from 0 to 4 and are based on the highest reported level of emotional complexity in the description. The total-awareness score equals the highest score of the self- and the other-awareness score, yet, a score of 5 is assigned if both the self- and the other-awareness score are 4 and there is

differentiation between the emotion words that are used for the self-perspective and the other-perspective.

Prior validation studies with the LEAS-C showed an acceptable reliability, with α s ranging between .64 and .76 (Bajgar et al., 2005; Marchetti et al., 2010; Veirman et al., 2011), and a high inter-rater reliability, with r 's ranging between .86 and .93 (Bajgar et al. 2005; Marchetti et al., 2010). Further, internal structure analyses supported a one-factor model on the total scores and a two-factor model on self and other scores jointly (Veirman et al., 2005). Convergent validity has been found with self-report and maximum performance emotional intelligence, intelligence and personality. Small negative correlations have been reported with externally-oriented thinking, the cognitive facet of alexithymia, and overall alexithymia. Further, small to moderate positive correlations have been observed with empathy (Marchetti et al., 2010), emotion comprehension (Bajgar et al., 2005), emotion recognition (Bajgar et al., 2005; Mancini et al., 2013), and understanding emotions, managing emotions, and overall emotional intelligence (Veirman et al., 2011). Research investigating the relationship with intelligence found small to moderate correlations with vocabulary, verbal productivity (Bajgar et al., 2005; Mancini et al., 2013), verbal intelligence (Veirman et al., 2011), and abstract reasoning (Mancini et al., 2013; Veirman et al., 2011). Small correlations have also been observed with scholastic language grades (Mancini et al., 2013). For personality, small correlations have been found with openness, agreeableness, and conscientiousness. Discriminant validity has also been established. No correlations were observed with performance intelligence and social and emotional impairment (i.e., self-concept, depression, anxiety, anger, and disruptive behaviors) (Veirman et al., 2011). Gender differences have shown that girls outperformed boys (Bajgar et al., 2005; Mancini et al., 2013; Veirman et al., 2011). In contrast, the theoretically expected age differences were not significant (Bajgar et al., 2005; Veirman et al., 2011). Only one study found a small age effect for total-awareness scores ($\beta = .09$), yet, not for self- and other-awareness scores (Mancini et al., 2013). The lack of evidence for robust age differences in emotional awareness is problematic for the validity of the cognitive-developmental LEA model, especially because it is unlikely that emotional awareness would be fully developed by childhood. For example, Labouvie-Vief and colleagues (Labouvie-Vief, Chiodo, Goguen, Diehl, & Orwoll, 1995;

Labouvie-Vief, De Voe, & Bulka, 1989; see also Labouvie-Vief, 2003) found in their developmental research with hundreds of 10- to 80-year-olds that people gain cognitive-affective complexity as they mature (i.e., they gained more conscious insight into emotion aspects that were unconscious before, acquired clearer differentiation of self from others, and blended distinct emotions).

As suggested by Veirman et al. (2011), a more plausible explanation is that robust age differences cannot be found due to limitations of the LEAS-C test. In specific, the main focus on feelings in the instructions and the scoring procedure contrasts with contemporary emotion psychology that recognizes a component process definition of emotion (e.g., Scherer, 2005). In this definition, an emotion is seen as an episode that is characterized by interrelated, synchronized changes in five emotion components (or states of the organismic subsystems): (1) the appraisal (or cognitive) component involves changes in the evaluation of objects or events depending on its personal significance, (2) the bodily reaction (or neurophysiological) component involves changes in physiological responses of the body such as for instance a slowed heart rate or sweating, (3) the action tendency (or motivational) component involves changes in the preparation and direction of behavioral tendencies such as doing nothing or hiding from others, (4) the expression (or motor) component involves changes in the communication of reactions and behavioral intentions in facial (e.g., smiling, frowning), vocal (e.g., whispering, screaming), and gestural (e.g., head bent down) behavior, and (5) the feeling (or subjective experience) component involves changes in the monitoring and regulation of internal state and person-environment interaction, and as such is the integrated conscious experience of the other components, such as feelings of anger or shame. Moreover, it has been found that these five emotion components are encoded in languages across the world (Fontaine & Scherer, 2013).

Based on this component process definition of emotion, we can now argue that emotional awareness or the complexity of emotion schemata is reflected in the extent to which all components that constitute an emotion are cognitively represented. So, it can be questioned whether the current instructions and scoring procedure of the LEAS-C are able to capture emotional awareness defined in this way.

With respect to the instructions, children may differentially interpret the

word *feel* and thus vary in what they think they are expected to respond, independent of the complexity of their mental representation of the emotional experience. In daily life, the word *feel(ing)* is often used to stress the subjective nature of an emotional experience. So, it can refer to all aspects of the emotion process that can be 'felt' (Mulligan & Scherer, 2012). Some children might think that they have to report the most salient aspect of the emotional experience (which can be an appraisal, an action tendency, a bodily reaction, or an expression), other children might think that they should give a feeling or an emotion term, and still other children might think that they need to report on the whole emotion process. Such divergence in the interpretation of the instructions will lead to construct irrelevant response variation. This possible source of construct irrelevant response variation can be avoided by making explicitly clear in the instructions that, while attended to all emotion components, children should try to report as completely as possible on the emotional experience.

As concerns the scoring procedure, children may be disadvantaged in the scores they are assigned because the highest level of emotional complexity is taken as the final score for each perspective in each scenario, regardless of whether descriptions contain information on other levels. For instance, someone who describes "I would think that the way I was treated was unjustified, I would feel angry, I would start yelling at the other person and feel hot inside my body, I would want to hit the other person, but would suppress my aggression" receives the same score than someone who just describes "I would be angry". So, the current scoring procedure does not fully capture the complexity of the emotional experience defined in terms of a component process definition to emotion. This problem could be dealt with in the scoring procedure by accounting for the different emotion components on which information is given.

Current study

In light of the alternative explanations for why age differences in emotional awareness have not been robustly established in prior research with the LEAS-C, the current study made two adaptations to the LEAS-C test: (1) the instructions are changed from "How would you / the other person feel?" to "What would you / the other person experience?" with an explicit explanation that experience can refer to all components of the emotion process, and (2) a componential scoring

procedure is developed that counts the different emotion components that are represented in descriptions². These two adaptations are expected to improve validity of the original LEAS-C and especially reveal age differences. This is examined in four steps. First, the reliability of the original scoring and the componential scoring is compared and the inter-rater reliability is investigated for the componential scoring. Second, the internal structure is investigated via confirmatory factor analyses (CFA). Three models are tested for both scoring methods: a one-factor model on the total scores, a one-factor model on self and other scores jointly, and a two-factor model on self and other scores jointly. Based on previous research, it is expected that the one-factor model on the total scores would provide a satisfying fit, and that the two-factor model on self and other scores jointly is adequate. Third, the network of convergent and discriminant relationships (i.e., alexithymia, emotional intelligence, intelligence, personality, and social and emotional impairment) and gender differences are examined. Here, we expect to replicate prior findings on the pattern of correlations and on gender differences. Finally, we investigate whether the adaptations will reveal age differences.

MATERIALS AND METHOD

Participants

The sample of the Flemish school population comprised 574 Belgian children (39% males) aged between 8 and 16 ($M_{\text{age}} = 13.45$, $SD_{\text{age}} = 1.84$). We consulted an official report published by the Flemish Ministry of Education and Training to select primary school children and secondary school children from different educational levels with respect to gender and age. The mother tongue of Dutch was used as a requisite for inclusion.

Levels of Emotional Awareness Scale for Children - adapted

Because the componential instructions stimulate respondents to provide much more information, the full version of the LEAS-C with 12 scenarios would have

² Although not considered as a 'real' component in the component process definition to emotion, regulation was included as an additional component because of its central position in emotion research (e.g., Gross & Thompson, 2007) and emotional intelligence research (e.g., Salovey & Mayer, 1990).

been long and time-consuming for respondents to complete. To diminish the risk that overload and tiredness may negatively affect the scores, the length of the instrument was reduced. Therefore, six scenarios out of the 12 were selected. The scenarios of this short version of the LEAS-C (i.e., fire trucks at home, saving pocket money, nice words, death of a pet, unacceptable work, and secrets) have shown to share high factor loadings and low error covariances for a final two-factor model on the self and other scores jointly in previous research (see Table 2 in Veirman et al., 2011). These six scenarios also represent major sources of variation in the emotion domain. They capture the main dimensions of emotional experience, namely valence (i.e., happiness), power (i.e., anger/sadness), arousal (i.e., anxiety), and novelty/care (i.e., surprise, concern) (Fontaine, Veirman, & Groenvynck, 2013). The scenarios are presented in the same order of appearance as in the original instrument. In each scenario, participants are asked to report on two questions, i.e., “What would you experience in this situation (for example feel, think, sense, show, want to do, and how would you cope with)?” and “What would the other person experience in this situation (for example feel, think, sense, show, want to do, and how would the other person cope with)?” Two scoring procedures are applied: the original scoring key proposed by Lane and Schwartz (1987) as presented in the introduction, and a new componential emotion scoring key. In this componential scoring, emotional complexity is coded as the number of different emotion components that are represented in the descriptions (feelings, appraisals, bodily reactions, expressions, action tendencies, and regulation). For each scenario, self-awareness and other-awareness scores range between 0 (no components are represented in the description) and 6 (all components are at least once represented in the description). For instance, the description ‘I would feel scared, have a faster breathing and would like to run away’ contains a feeling, a bodily reaction, and an action tendency, resulting in a score of 3 for the self-perspective, whereas the description ‘I feel scared’ contains only a feeling, resulting in a score of 1 for the self-perspective. The total-awareness score ranges between 0 and 12 per scenario, and is calculated as the sum of the self-awareness score and the other-awareness score.

Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV; Mayer, Salovey, & Caruso, 2015)

The 101-item (of which 97 items are scored) MSCEIT-YV measures performance on four emotional intelligence branches, i.e. perceiving emotions, facilitating thoughts, understanding emotions, and managing emotions, and overall emotional intelligence. It can be used from age 10 onwards. Cronbach's α s were .65 for perceiving emotions, .65 for facilitating thoughts, .64 for understanding emotions, .67 for managing emotions, and .76 for total emotional intelligence.

Alexithymia Questionnaire for Children (AQ-C; Rieffe, Oosterveld, & Meerum Terwoght, 2006)

The AQ-C is a 20-item self-report questionnaire, assessing difficulties in identifying feelings, difficulties in describing feelings, externally-oriented thinking, and overall alexithymia. It is suited for administration from age 9 onwards. Items are rated on a 3-point scale (1 = *not true* and 3 = *true*). Corresponding Cronbach's α s were .75, .72, .36³, and .71.

Wechsler Intelligence Scale for Children - Third Edition - NL (WISC-III-NL; Kort et al., 2005) and Raven's Standard Progressive Matrices (SPM; Raven, 1960)

The WISC-III and the SPM measure intelligence from age 6 onwards. The WISC-III assesses verbal and nonverbal intelligence. Through 13 subtests, three main scores are yielded, i.e., verbal IQ, performance IQ, and total IQ. The SPM measures abstract reasoning and comprises 60 multiple choice items, divided in five different sets with increasing difficulty. Cronbach's α for SPM was .85.

Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999)

The HiPIC is a 144 self-report questionnaire, assessing the Big Five personality factors of neuroticism, extraversion, agreeableness, openness, and conscientiousness. It can be used from age 8 onwards. Items are rated on a 5-

³ The low Cronbach's α for externally-oriented thinking is consistent with those reported in literature (Rieffe et al., 2006), though, signify that a careful interpretation of correlations with this scale is needed.

point scale (1 = *uncharacteristic* and 5 = *very characteristic*). Cronbach's α s were respectively .32⁴, .69, .65, .83, and .87.

Beck Youth Inventories (BYI; Dillen, Fontaine, & Verhofstadt-Denève, 2009).

The BYI measure social and emotional impairment and consist of five 20-item self-report inventories on self-concept, depression, anxiety, anger, and disruptive behaviors. These inventories can be used from age 7 onwards. Items are rated on a 4-point scale (0 = *never* to 3 = *always*). Corresponding Cronbach's α s were .82 for self-concept, .89 for depression, .88 for anxiety, .88 for anger, and .83 for disruptive behaviors.

Procedure

Parents of eligible children received a letter describing the study, its objectives, and information that they could end participation at any time during the research without justification. Upon permission, parents and their children filled out informed consents. Tests were administered individually at home by trained research assistants, seated at a table in front of the children. After participation, parents and children were debriefed and thanked for their cooperation.

RESULTS

Frequencies of levels and components

The 574 children and adolescents each filled out six scenarios, or 3444 scenarios, with a total of 6888 self and other descriptions. These descriptions were scored in agreement with both the original scoring procedure and the componential scoring procedure. For the original scoring, self descriptions were coded 528 times at Level 0 (or 15.33%), 55 times at Level 1 (or 1.60%), 642 times at Level 2 (or 18.64%), 1532 times at Level 3 (44.48%), and 687 times at Level 4 (or 19.95%); other descriptions were coded 525 times at Level 0 (or 15.24%), 66 times at Level 1 (or 1.92%), 610 times at Level 2 (or 17.71%), 1663 times at Level 3 (or 48.29%), and 580 times at Level 4 (or 16.84%); and total descriptions were coded 194 times at level 0 (or 5.63%), 24 times at Level 1 (or 0.70%), 392 times at Level 2 (or 11.38%), 1826 times at Level 3 (or 53.02%), 823

⁴ Neuroticism α is low in comparison to the fair to good α s of the other scales in the present study, yet, consistent with the neuroticism α reported in Veirman et al (2009).

times at Level 4 (or 23.90%), and 185 times at Level 5 (or 5.37%). For the componential scoring, the self and other descriptions were coded as 1, 3935 times (57.13%) for the appraisals category (63.30% for self and 50.96% for other), 3915 times (56.84%) for the action tendency category (64.69% for self and 48.98% for other), 123 times (1.79%) for the bodily reaction category (2.58% for self and 0.99% for other), 985 times (14.30%) for the expression category (17.02% for self and 11.59% for other), 5031 times (73.04%) for the subjective feeling category (74.01% for self and 72.07% for other), and 315 times (4.57%) for the regulation category (4.62% for self and 4.53% for other).

Reliability

A subset of 348 scenarios for 58 randomly selected children (or 10% of the total sample) was scored according to the componential scoring by two independent raters. Inter-rater reliability was calculated by means of intra-class correlation coefficients (two-way random model, absolute agreement). Coefficients for self scores (single measures: .93), other scores (single measures: .92), and total scores (single measures: .95) were all above .80, thus, considered high (Nunnally & Bernstein, 1994).

Internal consistency was examined by means of Cronbach's alpha. For the original scoring, α s were .64 for self scores, .63 for other scores, and .74 for total scores. For the componential scoring, α s were .84 for self scores, .83 for other scores, and .90 for total scores. The α s for the original scoring were compared with the α s for the componential scoring (Cronbach, 1951; Diedenhofen, 2013; Feldt, Woodruff, & Salih, 1987). The α s were found significantly higher for the componential scoring for self scores, $\chi^2(1, N = 574) = 99.96, p < .001$; other scores, $\chi^2(1, N = 574) = 82.60, p < .001$; and total scores, $\chi^2(1, N = 574) = 127.65, p < .001$. Pearson correlations among self, other and total scores for the original scoring and the componential scoring are reported in Table 1.

Table 1

Pearson Correlations among LEAS-C Self, Other and Total Scores for the Original and the Componential Scoring

LEAS-C scores	1.	2.	3.	4.	5.
1. Original scoring - Self	-				
2. Original scoring - Other	.61**	-			
3. Original scoring - Total	.83**	.84**	-		
4. Componential scoring - Self	.60**	.48**	.54**	-	
5. Componential scoring - Other	.50**	.53**	.53**	.82**	-
6. Componential scoring - Total	.58**	.53**	.56**	.95**	.95**

** $p < .01$.

Internal structure

We applied CFA to the data scored with the original scoring key and the data scored with the componential scoring key via *Mplus* 6.11. (Muthén & Muthén, 1998-2011). Schweizer's (2010) criteria were used to evaluate the resulting fit indices (good fit: $\chi^2/df < 2$, CFI $> .95$, RMSEA $< .05$, and SRMR $< .10$; acceptable fit: $\chi^2/df < 3$, CFI $> .90$, RMSEA $< .08$, and SRMR $< .10$). Model parsimony was determined by inspection of the lowest BIC information criteria (Kline, 2005, p. 143). We used Tabachnick and Fidell's (2007) rule of thumbs to interpret the resulting standardized factor loadings. Factor loadings above .71 are excellent, .63 are very good, .55 are good, .45 are fair, .32 are poor, and lower factor loadings are not interpreted. The theoretical model on the total scores yielded good fit indices for both scoring procedures (see Table 2 for fit values of the tested models). For each scoring procedure, the one-factor and two-factor models on the self and other scores jointly showed highly similar acceptable to good fit indices, yet, the lowest BIC values were observed for the one-factor models. The one-factor model on the self and other componential scores generally showed better fit values than the one-factor model on the self and other original scores (see Table 3 for standardized factor loadings of the tested models).

Table 2

Comparison of Fit Indices of Various Models Regarding the Structure of the Adapted LEAS-C for the Original Scored Data and the Componential Scored Data Obtained by Confirmatory Factor Analyses (Maximum Likelihood)

Model	χ^2	<i>df</i>	χ^2/df	SRMR	RMSEA	CFI	BIC
Original scoring							
One-factor total	15.88	9	1.76	.02	.04	.99	9392.37
One-factor self + other	156.07	54	2.89	.04	.06	.90	21188.25
Two-factor self + other	155.30	53	2.93	.04	.06	.90	21190.66
Componential scoring							
One-factor total	12.03	9	1.34	.01	.02	1.00	11137.02
One-factor self + other	147.01	54	2.72	.03	.06	.97	15590.81
Two-factor self + other	144.92	53	2.73	.03	.06	.97	15591.90

Note. *df* = degrees of freedom; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CFI = comparative fit index; BIC = Bayesian information criterion.

Table 3

Standardized Parameter Estimates for All Tested Models Regarding the Structure of the Adapted LEAS-C for Original Scored Data and Componential Scored Data Obtained by Confirmatory Factor Analyses (Maximum Likelihood)

Scenario	Original scoring				Componential scoring			
	One-factor	One-factor	Two-factor		One-factor	One-factor	Two-factor	
	F_{total}	$F_{\text{self/other}}$	F_{self}	F_{other}	F_{total}	$F_{\text{self/other}}$	F_{self}	F_{other}
1 Fire trucks at home (you-mum)	.57	.57/.57	.57	.57	.76	.68/.70	.69	.70
2 Saving pocket money (you-friend)	.60	.50/.43	.50	.44	.78	.70/.63	.70	.64
3 Nice words (you-person)	.58	.48/.47	.48	.48	.80	.68/.70	.68	.71
4 Death of pet (you-father)	.51	.49/.44	.49	.45	.75	.70/.67	.70	.67
5 Inacceptable work (you-teacher)	.58	.45/.43	.46	.44	.80	.72/.67	.73	.67
6 Secrets (you-kid)	.58	.44/.41	.44	.42	.75	.61/.62	.61	.62

Note. F_{total} : Factor loadings of total scores on the identified Total factor (one-factor total model); $F_{\text{self/other}}$: Factor loadings of self/other scores on the identified Self/Other factor (one-factor self + other model); F_{self} : Factor loadings of self scores on the first identified Self factor, and F_{other} : Factor loadings of other scores on the second identified Other factor (two-factor self + other model). Correlation between F_{self} and F_{other} is .97 for the original scoring, and .98 for the componential scoring.

Network of convergent and discriminant relationships

Means and standard deviations of external criteria and correlations with self, other and total scores are presented in Table 4⁵. For the original and the componential scoring, small positive correlations were found with facilitating thoughts, understanding emotions, managing emotions, overall emotional intelligence, verbal intelligence, overall intelligence, abstract reasoning, extraversion, and openness. A small positive correlation was also observed with neuroticism for the componential scoring. And finally, for both scoring procedures, small negative correlations were observed with externally-oriented thinking and overall alexithymia, whereas no significant correlations were found with performance intelligence and social and emotional impairment (i.e., self-concept, depression, anxiety, anger and disruptive behaviors).

⁵ Consistent with prior research on the LEAS and LEAS-C, correlations with external criteria are discussed in terms of total scores. For convention, correlations with external criteria are presented in Table 4 for total scores as well as self and other scores.

Table 4

Means (M) and Standard Deviations (SD) of External Criteria and Pearson Correlations (r) with Self, Other, and Total Scores of the adapted LEAS-C for Original Scored Data and Componential Scored Data

Scale	<i>M</i>	<i>SD</i>	Original scoring			Componential scoring		
			<i>r</i> _{self}	<i>r</i> _{other}	<i>r</i> _{total}	<i>r</i> _{self}	<i>r</i> _{other}	<i>r</i> _{total}
Emotional Intelligence								
MSCEIT-YV – Perceiving emotions	32.27	7.19	.05	.05	.01	-.01	-.01	-.01
MSCEIT-YV – Facilitating thoughts	28.85	5.58	.17**	.08	.13**	.13**	.13**	.14**
MSCEIT-YV – Understanding emotions	29.60	6.26	.20**	.20**	.21**	.17**	.21**	.20**
MSCEIT-YV – Managing emotions	22.08	5.55	.19**	.17**	.17**	.14**	.17**	.16**
MSCEIT-YV – Total	112.80	15.20	.24**	.20**	.20**	.17**	.19**	.19**
Alexithymia								
AS-C – Identification	12.27	3.07	-.02	-.02	-.02	-.00	-.01	-.01
AS-C – Communication	9.24	2.54	-.05	-.09*	-.05	-.05	-.00	-.03
AS-C – Externally-oriented thinking	14.41	2.39	-.12**	-.10*	-.12**	-.24**	-.22**	-.24**
AS-C – Total	35.93	5.60	-.09*	-.10*	-.08*	-.13**	-.10*	-.12**
Intelligence								
WISC-III – Verbal IQ	106.73	13.72	.11**	.13**	.13**	.13**	.10*	.12**
WISC-III – Performance IQ	103.29	13.99	.02	.04	.04	.06	.03	.05
WISC-III – Total IQ	105.88	13.48	.08	.10*	.10*	.11**	.08	.10*
SPM – Abstract reasoning	46.69	6.26	.17**	.15**	.16**	.23**	.22**	.24**

Note. LEAS-C: Levels of Emotional Awareness Scale for Children; MSCEIT-YV: Mayer Salovey Caruso Emotional Intelligence Test Youth Version, branch and total scores are summed items scores; AS-C: Alexithymia Scale for Children; WISC-III: Wechsler Intelligence Scale for Children Third Edition; SPM: Standard Progressive Matrices; HiPIC: Hierarchical Personality Inventory for Children; BYI: Beck Youth Inventories.

* $p < .05$. ** $p < .01$.

Table 4 (continued)

Means (M) and Standard Deviations (SD) of External Criteria and Pearson Correlations (r) with Self, Other, and Total Scores of the adapted LEAS-C for Original Scored Data and Componential Scored Data

Scale	<i>M</i>	<i>SD</i>	Original scoring			Componential scoring		
			<i>r</i> _{self}	<i>r</i> _{other}	<i>r</i> _{total}	<i>r</i> _{self}	<i>r</i> _{other}	<i>r</i> _{total}
Personality								
HiPIC – Neuroticism	41.19	9.45	.05	.01	.04	.09*	.09*	.09*
HiPIC – Extraversion	111.12	15.13	.11**	.15**	.15**	.09*	.10*	.10*
HiPIC – Openness	81.79	11.63	.09*	.11**	.11**	.12**	.09*	.11**
HiPIC – Agreeableness	142.01	16.44	.07	.08*	.06	.08	.07	.08
HiPIC – Conscientiousness	102.95	15.65	.08*	.04	.08	.08	.03	.06
Social and Emotional Impairment								
BYI – Self-concept	36.24	6.45	.02	.02	.02	-.01	-.01	-.01
BYI – Depression	10.01	6.62	-.03	-.02	-.01	-.02	-.07	-.05
BYI – Anxiety	14.30	7.55	.04	.01	.05	.05	.01	.03
BYI – Anger	11.56	6.64	-.06	-.07	-.06	-.03	-.09*	-.07
BYI – Disruptive behaviors	6.51	4.45	-.01	-.00	.02	-.03	-.04	-.04

Note. LEAS-C: Levels of Emotional Awareness Scale for Children; MSCEIT-YV: Mayer Salovey Caruso Emotional Intelligence Test Youth Version, branch and total scores are summed items scores; AS-C: Alexithymia Scale for Children; WISC-III: Wechsler Intelligence Scale for Children Third Edition; SPM: Standard Progressive Matrices; HiPIC: Hierarchical Personality Inventory for Children; BYI: Beck Youth Inventories.

* $p < .05$. ** $p < .01$.

Gender and age

Six ANCOVAs were performed to investigate gender differences. Verbal intelligence was controlled for because girls typically perform better than boys on verbal and written language tasks (Burman, Bitan, & Booth, 2008). Girls outperformed boys, for the original scoring on self scores, $F(1, 571) = 15.78, p < .001$ (partial $\eta^2 = .03$); other scores, $F(1, 571) = 4.21, p < .05$ (partial $\eta^2 = .01$); and total scores, $F(1, 571) = 9.95, p < .01$ (partial $\eta^2 = .02$); as well as for the componential scoring on self scores, $F(1, 571) = 19.81, p < .001$ (partial $\eta^2 = .03$); other scores, $F(1, 571) = 10.65, p = .001$ (partial $\eta^2 = .02$); and total scores, $F(1, 571) = 16.36, p < .001$ (partial $\eta^2 = .03$). For the original scoring procedure, small positive correlations were observed between age and self scores ($r = .17, p < .001$), other scores ($r = .14, p = .001$), and total scores ($r = .19, p < .001$). For the componential scoring procedure, small to moderate positive correlations were observed between age and self scores ($r = .30, p < .001$), other scores ($r = .28, p < .001$), and total scores ($r = .30, p < .001$). Comparison of the correlations with age for the original and componential scoring indicated the latter were substantially higher, for self scores ($z = 3.61, p < .001$), other scores ($z = 3.56, p < .001$), as well as total scores ($z = 2.92, p < .001$).

DISCUSSION

The main aim of the present research was to investigate whether the validity of the original LEAS-C could be improved and the theoretically expected age differences in emotional awareness from childhood into adolescence would emerge in case the instructions and the scoring procedure of the LEAS-C were adapted on the basis of the componential emotion approach.

The results showed that the adapted LEAS-C with a by half reduced number of scenarios is reliable. The original scoring procedure yielded similar internal consistency coefficients, yet, the componential scoring showed substantially higher internal consistency coefficients than those reported in literature for the original LEAS-C (Bajgar et al., 2005; Marchetti et al., 2010; Veirman et al., 2011). The componential scoring, moreover, showed high inter-rater reliability, endorsing the quality of the componential scoring procedure.

The internal structure of the adapted LEAS-C showed acceptable to good fit for all tested models. Generally, the tested models showed a better fit and

consistently higher factor loadings for the componential scoring compared to the original scoring. As expected, the one-factorial model on the total scores fitted well for both scoring procedures. However, contrary to the expectations, the two-factorial model on the self and other scores jointly did not fit substantially better than the one-factorial model on the self and other scores jointly, neither for the original scoring procedure, nor for the componential scoring procedure. This finding is in contrast with prior research on the original LEAS-C, where a two-factorial structure with distinct self and other factors clearly fitted better (Veirman et al., 2011).

The one-factorial structure of self and other scores for the adapted LEAS-C may have been the result of the componential instructions. It is likely that different aspects of the emotion process are salient for the self- and the other-perspective. For instance, it could be that the feeling component is more salient for the self-perspective, as one has more access to one's own internal experiences, while the action tendency component is more salient for the other-perspective, because in a social interaction knowing how the other would behave is the important information. Such a difference in salience would affect the original LEAS-C with feeling instructions much more than the adapted LEAS-C with componential instructions. Because in the current study children were stimulated to report on the experience, thus the whole emotional process, for both perspectives and because all emotion components contributed to the scoring for both perspectives, the difference in salience may have had less effect on the scores.

It has to be noted though that the one-factorial structure of self and other scores for the adapted LEAS-C does not exclude genuine differences between the self- and the other-perspective, because one has differential access to the emotion components from both perspectives in real-life, with bodily reactions and expressions being the most different. One has direct access to one's own bodily reactions, while one has only seldom access to someone else's bodily reactions (only in intense situations bodily reactions might become noticeable). In real-life, one has direct access to the expressions of others, but less so to one's own emotional expressions. It is thus possible that some people are more able to interpret their internal experiences and others are more able to interpret the expressions of others. This can, however, not be investigated with a scenario-

based instrument where all information, both for the self- and the other-perspective, stems from a verbal description of an emotion eliciting situation. Indeed, only three of the six emotion components, feelings, action tendencies and appraisals were most frequently represented in the descriptions. So, children are in these scenarios mainly focused on what the self- and the other-perspective would think (interpretation of the situation), do (resulting tendency to act or actions) and feel (comprehensive whole that captures the emotional experience) in the given situations. Because of the pure verbal nature of the information, participants have no access to their own bodily reactions, nor to the expressions of others. It would be therefore interesting for future research to investigate to which extent the frequencies with which the components are represented in descriptions depend on the methodology that is used. For instance, asking to re-experience past emotional episodes may result in more information on bodily reactions, or a video scenario test may result in more information on expressions.

The observation that appraisals are among the most frequent represented components in the descriptions, stresses the importance of appraisals for emotion representations. This is in line with appraisal theories of emotion, considering that “people’s subjective evaluation of the significance of the events for their well-being and goal achievements elicits the emotion process and determines the response patterning” (Scherer, 2013; p. 11). At the same time, this observation contrasts the LEA model in which cognitions are related to low emotional awareness levels.

With respect to the network of convergent and discriminant relationships, our results demonstrated that the pattern of correlations for this adapted LEAS-C is in line with prior research for both scoring procedures. For example, the absence of correlations with measures of psychopathology supports the claim that the instrument is measuring the structural properties of the emotional representation and not their typical content (e.g., Veirman et al., 2011). Yet, the magnitude of the significant correlations remains small. An explanation may be that the correlations between this structural type of measurement and self-report personality/emotional intelligence measures and maximum performance emotional intelligence measures are underestimated because these measures have their own specific problems that a structural measure has not. Self-report

personality/emotional intelligence measures are for example liable to response biases (e.g., social desirability, acquiescent or extreme responding). Maximum performance emotional intelligence measures are for instance confronted with difficulties in identifying the correct responses to emotion-related questions. In either case, future research is needed to clarify the unique position that the LEAS-C holds between self-report and maximum performance emotional intelligence assessment. Since this type of measurement has been classified as measuring emotion processing (Ciarrochi, Caputi, & Mayer, 2003), experimental research is a possible pathway to follow in future. The integration of a traditional psychometric approach to emotional awareness and the investigation of the underlying cognitive processes may be fruitful for a better understanding of the concept of emotional awareness.

Further, our results confirm the role of gender in explaining self, other, and total emotional awareness, supporting previous considerations in literature that girls outperform boys (Bajgar et al., 2005; Mancini et al., 2013; Veirman et al., 2011). We note that these gender differences are more pronounced for the componential scored data than the original scored data.

Finally, our findings show that the change of the instructions already allowed us to find age differences in emotional awareness with the original scoring procedure. So, if children are asked to provide all information of the emotional experience they can cognitively represent, less random variation in responses occurs. In case the componential scoring was applied, age differences became even more pronounced, suggesting that this componential scoring is better able to capture the complexity of the emotion representations in people's descriptions to scenarios. Moreover, these age differences are found for total emotional awareness, as well as self and other emotional awareness. These results on age differences for the adapted LEAS-C are the first in the LEAS literature, be it the child or adult version, to fully support Lane and Schwartz's (1987) premise that emotional complexity develops with age.

Some limitations also require discussion. A first limitation is that the adapted LEAS-C with componential instructions and scoring procedure is at least as intensive to score as the full LEAS-C with original instructions and scoring procedure. Even though the number of scenarios was halved, the componential instructions generally resulted in much richer and longer descriptions. Another

limitation is that the data of children and adolescents were collected in the general population. Whereas the adult version of this test has proven to be useful in clinical populations (e.g., Subic-Wrana, Bruder, Thomas, Lane, & Köhle, 2005), the utility of this adapted LEAS-C for clinical practice has still to be demonstrated.

In conclusion, the results of the present study on the adapted LEAS-C are encouraging. The psychometric quality and the validity of the original LEAS-C was generally improved and age differences in emotional awareness were demonstrated, signifying that a componential emotion approach is a valuable basis for emotional awareness measurement.

REFERENCES

- Bajgar, J., Ciarrochi, J., Lane, R. D., & Deane, F. (2005). Development of the Levels of Emotional Awareness Scale for Children (LEAS-C). *British Journal of Developmental Psychology*, 23, 569-586. doi:10.1348/026151005X35417
- Barchard, K. A., Bajgar, J., Leaf, D. E., & Lane, R. D. (2010). Computer scoring of the Levels of Emotional Awareness Scale. *Behavior Research Methods*, 42, 586-595. doi:10.3758/BRM.42.2.586
- Burman D. D., Bitan T., & Booth, J. R. (2008). Sex differences in neural processing of language among children. *Neuropsychologia*, 46, 1349-1362. doi:10.1016/j.neuropsychologia.2007.12.021
- Ciarrochi, J., Caputi, P., & Mayer, J. D. (2003). The distinctiveness and utility of a measure of trait emotional awareness. *Personality and Individual Differences*, 34, 1477-1490. doi:10.1016/S0191-8869(02)00129-0
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334. doi:10.1007/BF02310555
- Diedenhofen, B. (2013). cocron: Statistical comparisons of two or more alpha coefficients (Version 1.0-0). Retrieved from <http://r.birkdiedenhofen.de/pckg/cocron/>
- Dillen, L., Fontaine, J. R. J., & Verhofstadt-Denève, L. (2009). Confirming the distinctiveness of complicated grief from depression and anxiety among adolescents. *Death Studies*, 33, 437-461. doi:10.1080/07481180902805673
- Feldt, L. S., Woodruff, D. J., & Salih, F. A. (1987). Statistical inference for coefficient alpha. *Applied Psychological Measurement*, 11, 93-103. doi: 10.1177/014662168701100107
- Flavell, J. H. (1963). *The developmental psychology of Jean Piaget*. London: D. Van Nostrand Company.
- Fontaine, J. R. J., & Scherer, K. R. (2013). Promises delivered, future opportunities, and challenges for the GRID paradigm. In J. R. J. Fontaine, K. R. Scherer, & C. Soriano (Eds.), *Components of emotional meaning: A sourcebook* (pp. 542-559). Oxford: Oxford University Press.
- Fontaine, J. R. J., Veirman, E., & Groenvynck, H. (2013). From meaning to experience: The dimensional structure of emotional experiences. In J. R.

- J. Fontaine, K. R. Scherer, & C. Soriano (Eds.), *Components of emotional meaning: A sourcebook* (pp. 243-260). Oxford: Oxford University Press.
- Gross, J. J., & Thompson, R. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3-24). New York: Guilford Press.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.
- Kort, W., Schittekatte, M., Bosmans, M., Compaan, E. L., Dekker, P. H., Vermeir, G., & Verhaeghe, P. (2005). *WISC-III - NL: Wechsler Intelligence Scale for Children. Handleiding en verantwoording [Dutch manual]*. Amsterdam: Harcourt Test Publishers.
- Labouvie-Vief, G. (2003). Dynamic integration: Affect, cognition, and the self in adulthood. *Current Directions in Psychological Science*, 12, 201-206. doi:10.1046/j.0963-7214.2003.01262.x
- Labouvie-Vief, G., Chiodo, L. M., Goguen, L. A., Diehl, M., & Orwoll, L. (1995). Representations of self across the life span. *Psychology and Aging*, 10, 404-415. doi:10.1037/0882-7974.10.3.404
- Labouvie-Vief, G., DeVoe, M., & Bulka, D. (1989). Speaking about feelings: Conceptions of emotion across the life span. *Psychology and Aging*, 4, 425-437. doi:10.1037/0882-7974.4.4.425
- Lane, R. D. (2000). Levels of emotional awareness: Neurological, psychological and social perspectives. In R. Bar-On & J. D. A. Parker (Eds.), *Handbook of emotional intelligence* (pp. 171-191). San Francisco: Jossey-Bass.
- Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The Levels of Emotional Awareness Scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment*, 55, 124-134. doi:10.1080/00223891.1990.9674052
- Lane, R. D., Sechrest, L., Riedel, R., Weldon, V., Kaszniak, A., & Schwartz, G. E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. *Psychosomatic Medicine*, 58, 203-210.
- Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *American Journal of Psychiatry*, 144, 133-143. doi:10.1176/ajp.144.2.133
- Mancini, G., Agnoli, S., Trombini, E., Baldaro, B., & Surcinelli, P. (2013).

- Predictors of emotional awareness during childhood. *Health*, 5, 375-380. doi:10.4236/health.2013.53050
- Marchetti, A., Valle, A., Massaro, D., & Castelli, I. (2010). Emotional awareness in school-aged children: A contribution to the Italian validation of the LEAS-C. *Ricerche di Psicologia*, 4, 555-574. doi:10.4236/health.2013.53050
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2015). *Mayer-Salovey-Caruso Emotional Intelligence Test: YRV Researcher's guide*. Toronto: Multi-Health Systems.
- Mervielde, I., & De Fruyt, F. (1999). Construction of the Hierarchical Personality Inventory for Children. In I. Mervielde, I. J. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality psychology in Europe* (Vol. 7, pp. 107-127). Tilburg: University Press.
- Mulligan, K., & Scherer, K. R. (2012). Toward a working definition of emotion. *Emotion Review*, 4, 345-357. doi:10.1177/1754073912445818
- Muthén, L. K., & Muthén, B. O. (1998-2011). *Mplus user's guide* (6th ed.). Los Angeles: Authors.
- Nunnally, J. C. & Bernstein, I. H. (1994). *Psychometric theory*. New York: McGraw-Hill.
- Raven, J. C. (1960). *Guide to the standard progressive matrices*. London: H. K. Lewis & Co. Ltd.
- Rieffe, C., Oosterveld, P., & Terwogt, M. M. (2006). An alexithymia questionnaire for children: Factorial and concurrent validation results. *Personality and Individual Differences*, 40, 123-133. doi:10.1016/j.paid.2005.05.013
- Salovey, P., & Mayer, J. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, 9, 185-211. doi:10.2190/dug-p24e-52wk-6cdg
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44, 693-727. doi:10.1177/0539018405058216
- Scherer, K. R. (2013). Measuring the meaning of emotion words: A domain-specific componential approach. In J. R. J. Fontaine, K. R. Scherer, & C. Soriano (Eds.), *Components of emotional meaning: A sourcebook* (pp. 1-30). Oxford: Oxford University Press.
- Schweizer, K. (2010). Some guidelines concerning the modeling of traits and abilities in test construction. *European Journal of Psychological Assessment*, 26, 1-2. doi:10.1027/1015-5759/a000001

- Subic-Wrana, C., Bruder, S., Thomas, W., Lane, R. D., & Köhle, K. (2005). Emotional awareness deficits in inpatients of a psychosomatic ward: A comparison of two different measures of alexithymia. *Psychosomatic Medicine*, 67, 483-489. doi:10.1097/01.psy.0000160461.19239.13
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston: Pearson/Allyn & Bacon.
- Veirman, E., Brouwers, S. A., & Fontaine, J. R. J. (2011) The assessment of emotional awareness in children. Validation of the Levels of Emotional Awareness Scale for Children. *European Journal of Psychological Assessment*, 27, 265-273. doi:10.1027/1015-5759/a000073
- Werner, H., & Kaplan, B. (1963). *Symbol formation: An organismic developmental approach to language and the expression of thought*. NY: John Wiley.

CHAPTER 4

Revisiting the Dimensional Structure of the Emotion Domain¹

Abstract

Recent research has claimed that a novelty dimension is needed to represent the cognitive emotion structure over and above valence, power and arousal. Novelty emerged when student samples evaluated the meaning of 24 emotion terms on 142 emotion features. This claim is debatable, however, because to date novelty has never been found in similarity sorting studies. It is possible that novelty emerged because sophisticated student samples evaluated emotion terms on emotion features. The current research identified a large, representative set of emotion terms using a free-listing task in a middle childhood up to early adulthood sample ($N = 5071$). Children, adolescents, students and adults ($N = 1184$) then evaluated the similarity between these emotion terms using a similarity rating task without priming any emotion feature. Novelty robustly emerged as the fourth dimension. The existence of novelty is thus confirmed with a different method across a wide variety of participants.

¹ Veirman, E., & Fontaine, J. R. J. (in press). Revisiting the dimensional structure of the emotion domain, *Cognition and Emotion*, doi:10.1080/02699931.2014.963518

INTRODUCTION

Ever since Wundt (1905) theorized that affective experiences can be represented in a three-dimensional space, dimensional models have played a prominent role in emotion psychology. Moreover, they are crucial for the assessment of emotional experiences (e.g., Yik, Russell, & Barrett, 1999) and are considered at the core of the emotion construct by some emotion theories (e.g., Russell, 2003). They have been used to study the connotative meaning in psycholinguistic research (e.g., Osgood, May, & Miron, 1975) and the cognitive emotion representation (e.g., Fontaine, Poortinga, Setiadi & Suprapti, 2002; Shaver, Schwartz, Kirson, & O'Conner, 1987; Shaver, Wu, & Schwartz, 1992). According to the most popular models, valence and arousal, or a rotation thereof, structure the emotion domain (e.g., Yik et al., 1999). However, other models postulate valence and power to be the most important dimensions (e.g., Gehm & Scherer, 1988; Kitayama, Markus, & Kurokawa, 2000). Still other models claim that all three dimensions of valence, power and arousal are needed (e.g., Fontaine et al., 2002; Osgood et al., 1975; Shaver et al., 1987, 1992).

Recently, Fontaine, Scherer, Roesch, and Ellsworth (2007) applied a new theory-guided methodology to study the cognitive representation of the emotion domain. Their approach was based on the componential emotion theory, according to which emotions are defined as synchronized processes between five human subsystems that are elicited by goal-relevant events. These subsystems, also called components, are appraisal, action tendency, bodily reaction, expression and feeling (e.g., Scherer, 2009). The instrument they constructed (called the GRID instrument) contained 24 emotion terms that had to be rated on the likelihood of 142 emotion features. The emotion terms (such as "pleasure", "anger" and "guilt") were a priori selected to represent the emotion domain. The emotion features were derived from different emotion theories (e.g., Ekman, 1972; Frijda, 1986; Russell, 1980) and operationalized each of the five components (such as "the person wanted to flee" for the action tendency component). The evaluation of the meaning of the emotion terms on the emotion features revealed a four-dimensional structure of valence, power, arousal and novelty, in that order of importance. Unanticipated was the finding of the fourth novelty dimension, which was characterized by appraisals of suddenness and unpredictability, and facial expressions of jaw drop and opening eyes widely. The

four-dimensional structure was first observed in English, French and Dutch (Fontaine et al., 2007) and has more recently been confirmed in 27 languages using the same 24 emotion terms and 142 emotion features (Fontaine & Scherer, 2013).

The existence of a novelty dimension in the cognitive structure of the emotion domain is, however, debatable as this dimension has never been observed before. It is possible that previous studies simply were not able to reveal novelty because of methodological constraints. Yet, another explanation is that the emergence of this dimension is an artefact of the GRID methodology. The emergence of the novelty dimension in the GRID research may have been caused by (1) a disproportionate representation of novelty-related emotion terms, and/or (2) a disproportionate representation of novelty-related emotion features and/or (3) the reliance on sophisticated respondents. In the early 1990s, Russell (1991) already suggested that the selection of the emotion terms determines whether arousal (in case predominantly intrapersonal terms are used) or power (in case predominantly interpersonal terms are used) emerges as the second dimension. Thus, the selection of emotion terms determines which dimensions are likely to emerge. The novelty dimension may also have been elicited by the precise selection of the features in the GRID instrument (such as suddenly and unpredictable). Moreover, the samples in the GRID research consisted almost exclusively of psychology and linguistics students. Since these students have been trained to represent subtle meaning differences, the novelty dimension may not be generalizable to non-student samples.

In light of these alternative explanations for the emergence of the novelty dimension in the GRID research, the current research has three aims: (1) to empirically identify a representative set of emotion terms in which surprise-related terms are neither over- nor underrepresented, (2) to investigate whether novelty emerges as the fourth dimension in the cognitive emotion structure with a representative set of emotion terms and without priming (novelty-related) emotion features, and (3) to examine these two issues also in non-student samples. Two studies have been executed. In a first study, a representative set of emotion terms is empirically identified using a free-listing task in a middle childhood up to early adulthood sample. In a second study, the dimensional representation of the

emotion domain is examined on the basis of similarity ratings between emotion terms in a child-adolescent, a student and an adult sample.

STUDY 1: THE EMPIRICAL IDENTIFICATION OF A REPRESENTATIVE SET OF EMOTION TERMS

Since emotions cannot be defined by necessary and sufficient features, it is not possible to first clearly define the domain of emotion terms and then representatively sample from that domain. The emotion concept is rather organized as a prototype construct with a gradual shift from more to less prototypical emotion terms (e.g., Shaver et al., 1987). A free-listing task offers a simple and powerful way to identify the elements of a prototypically organized construct, because prototypical exemplars of a category come more readily to mind when the category is activated (e.g., Bernard, 2006). This method has often been used to identify emotion terms (e.g., Van Goozen & Frijda, 1993). An important limitation of previous studies is however the use of predominantly (psychology) student samples. Because students are sophisticated and especially psychology students might have been influenced by the psychological theories the research intends to investigate, the generalizability to a non-student population still remains to be demonstrated. In the current study, a free-listing task was applied to a large sample of middle childhood up to early adulthood participants representing various levels of education.

METHOD

Participants

In total, 5071 Dutch-speaking children and adolescents from the second year of primary school up to the last year of secondary school participated in the research (53.2% females, $M_{\text{age}} = 13.55$, $SD_{\text{age}} = 3.12$, 32.5% primary school children).

Procedure and free-listing task

A heterogeneous pool of private and state schools from the Dutch-speaking part of Belgium (i.e., Brussels and the Flemish region) was contacted by four trained research assistants of Ghent University. If a school agreed to participate, class teachers were informed on the purpose and design of the study. During regular

school hours, class teachers administered a paper and pencil questionnaire following specific guidelines (e.g., a procedure for responding to questions). Participation of pupils was anonymous and was based on passive consent. Pupils were first instructed to fill out demographic information. Then they were asked to write down as many emotion and feeling words and expressions as they could think of during a period of ten minutes. Based on a small pilot study, the term “emotie” (emotion) and the term “gevoel” (feeling) were both used in the instructions to make the task easier to understand, especially for the primary school children.

RESULTS

Identifying the prototypical emotion terms

The participants generated in total 124886 utterings. This extensive qualitative material was coded in four subsequent steps. In a first step, a selection was made by identifying those utterings that were mentioned by at least 50 respondents (or approximately 1% of the respondents). In a second step, the selected utterings were organized in categories by assigning all words with the same word stem and comparable meaning to the same category (e.g., happy, happily and happiness were all considered as members of the category happy). In total, 269 categories were identified and 89413 utterings (or 72% of all utterings) were coded in one of these categories.² In a third step, all utterings of the same participant that were coded in the same category were considered as a single uttering, leading to 84660 coded utterings (or 68%). In a last step, the list of 269 categories was reduced to a list of only emotion terms using a committee approach. Categories that referred to a single emotion component on the basis of the componential emotion theory (e.g., Scherer, 2009), such as “warm” (bodily sensation) and “laughing” (facial expression), to aspects of the antecedent situation, like “family” and “school”, or to personality characteristics, as for instance “arrogance”, were excluded. Judgements were first made independently by three emotion researchers. In case of disagreement, the final decision was made at a committee meeting together with two additional emotion researchers. In this way, a list of 74 categories containing only emotion terms was identified (see Table 1).

² It was possible that an uttering contained information about more than one category.

Table 1

Frequency and Proportion of the 74 Emotion Words in the Free Listing Task

Dutch term	English translation	Frequency (Proportion)
<i>blij</i>	<i>joyful</i>	4097 (.81)
boos	angry	3390 (.67)
<i>verdrietig</i>	<i>sad</i>	3341 (.66)
bang	afraid	2215 (.44)
verliefd	in love	2189 (.43)
<i>gelukkig</i>	<i>happy</i>	1895 (.37)
<i>liefde</i>	<i>love</i>	1696 (.33)
droevig	sorrowful	1525 (.30)
<i>kwaad</i>	<i>mad</i>	1375 (.27)
woedend	infuriated	1365 (.27)
<i>angstig</i>	<i>fearful</i>	1172 (.23)
<i>haat</i>	<i>hate</i>	1026 (.20)
<i>jaloers</i>	<i>jealous</i>	936 (.19)
verlegen	shy	916 (.18)
zenuwachtig	flustered	915 (.18)
eenzaam	lonely	892 (.18)
ongelukkig	unhappy	868 (.17)
triest	triste	793 (.16)
vrolijk	cheerful	790 (.16)
depressief	depressed	712 (.14)
verbaasd	astonished	625 (.12)
teleurgesteld	disappointed	605 (.12)
<i>gestresseerd</i>	<i>stressed</i>	508 (.10)
<i>beschaamd</i>	<i>ashamed</i>	492 (.10)
geschrokken	scared	492 (.10)
verveeld	bored	487 (.10)
<i>gekwetst</i>	<i>hurt</i>	445 (.09)
nieuwsgierig	curious	384 (.08)
opgewekt	lively	375 (.07)
geluk	bliss	371 (.07)
vreugde	delight	345 (.07)
<i>geïrriteerd</i>	<i>irritated</i>	321 (.06)
<i>trots</i>	<i>proud</i>	319 (.06)
verward	confused	319 (.06)
<i>ontgoocheld</i>	<i>disillusioned</i>	317 (.06)
twijfel	doubt	304 (.06)
opgelucht	relieved	304 (.06)

Note: Emotion terms that overlap with the GRID terms are in italics.

Table 1 (continued)

Frequency and Proportion of the 74 Emotion Words in the Free Listing Task

Dutch term	English translation	Frequency (Proportion)
<i>verrast</i>	<i>surprised</i>	301 (.06)
razend	raging	299 (.06)
vertrouwen	trust	280 (.06)
<i>plezier</i>	<i>pleasure</i>	260 (.05)
woest	fuming	256 (.05)
<i>tevreden</i>	<i>satisfied</i>	245 (.05)
enthousiast	enthusiastic	240 (.05)
<i>schuldig</i>	<i>guilty</i>	238 (.05)
fier	proud	221 (.04)
gefrustreerd	frustrated	218 (.04)
<i>ongerust</i>	<i>anxious</i>	214 (.04)
ontroerd	moved	186 (.04)
euforisch	euphoric	185 (.04)
verlangen	longing	181 (.04)
vervelend	uncomfortable	177 (.04)
treurig	mournful	171 (.03)
verwonderd	amazed	168 (.03)
spijt	regret	165 (.03)
bezorgd	worried	159 (.03)
hoop	hope	150 (.03)
medeleven	sympathy	140 (.03)
<i>medelijden</i>	<i>compassion</i>	119 (.02)
ongeduldig	impatient	113 (.02)
<i>wanhopig</i>	<i>desperate</i>	109 (.02)
<i>geïnteresseerd</i>	<i>interested</i>	106 (.02)
content	content	95 (.02)
furieus	furious	87 (.02)
verontwaardigd	indignant	86 (.02)
chagrijnig	miserable	83 (.02)
nijdig	cross	72 (.01)
neerslachtig	dejected	66 (.01)
gechoqueerd	shocked	65 (.01)
afgunstig	envious	64 (.01)
ontevreden	dissatisfied	63 (.01)
hopeloos	hopeless	62 (.01)
onschuldig	innocent	58 (.01)
heimwee	homesick	57 (.01)

Note: Emotion terms that overlap with the GRID terms are in italics.

In total, 44880 of the 84660 uniquely coded utterings (or 53%) were coded in one of the 74 emotion categories, each labelled with a single emotion term. Of these 74 terms, five terms clearly imply appraisals of suddenness and unexpectedness of the emotional event, namely *verbaasd* (astonished), *geschrokken* (scared), *verrast* (surprised), *verwonderd* (amazed) and *gechoqueerd* (shocked). Thus, 7% of the emotion categories were surprise-related, which is more than the 4% in the GRID research. Moreover, further inspection showed that explicit interpersonal emotion terms represented 15% of the total number of emotion terms (compared to 33% in the GRID research), namely *verliefd* (in love), *liefde* (love), *haat* (hate), *jaloers* (jealous), *verlegen* (shy), *eenzaam* (lonely), *beschaamd* (ashamed), *gekwetst* (hurt), *schuldig* (guilty), *medeleven* (sympathy) and *medelijden* (compassion).

Age and gender differences in the number of utterings, number of coded non-emotions and number of coded emotions

Three regression analyses were performed to examine age and gender differences in predicting (1) the total number of utterings, (2) the number of coded non-emotion terms and (3) the number of coded emotion terms (see Table 2). Both the main effect of age and gender as well as the interaction effect between age and gender were significant for predicting the total number of utterings (see Figure 1a) and the number of coded emotion terms (see Figure 1c). Older participants reported more utterings and more emotion terms than younger participants, girls reported more utterings and more emotion terms than boys, and the age effect was more pronounced for girls than for boys. For the number of coded non-emotion terms, only the effect of gender and the interaction effect with age was significant. Girls reported more non-emotion terms than boys. Moreover, girls report more non-emotion terms with increasing age, while there is a tendency for boys to report fewer non-emotion terms with increasing age (see Figure 1b).

Table 2

Hierarchical Regression Analyses on the Number of Utterings, the Number of Non-Emotion Terms, and the Number of Emotion Terms

Variable	Number of utterings				Number of non-emotions				Number of emotions			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	β	t	β	t	β	t	β	t	β	t	β	t
Age	.19	14.25***	.13	6.54***	.02	1.04	-.03	-1.61	.26	19.78***	.14	7.51***
Gender	.14	10.19***	-.14	-2.37*	.14	9.92***	-.06	-.95	.22	16.83***	-.29	-4.91***
Age x Gender			.30	4.79***			.21	3.27**			.54	8.95***
Adj. R^2		.06		.06		.02		.02		.12		.13
ΔR^2		.06		.00		.02		.00		.12		.01
F for change in R^2		152.91***		22.93***		49.72***		10.68**		336.21***		80.17***

* $p < .05$. ** $p < .01$. *** $p < .001$.

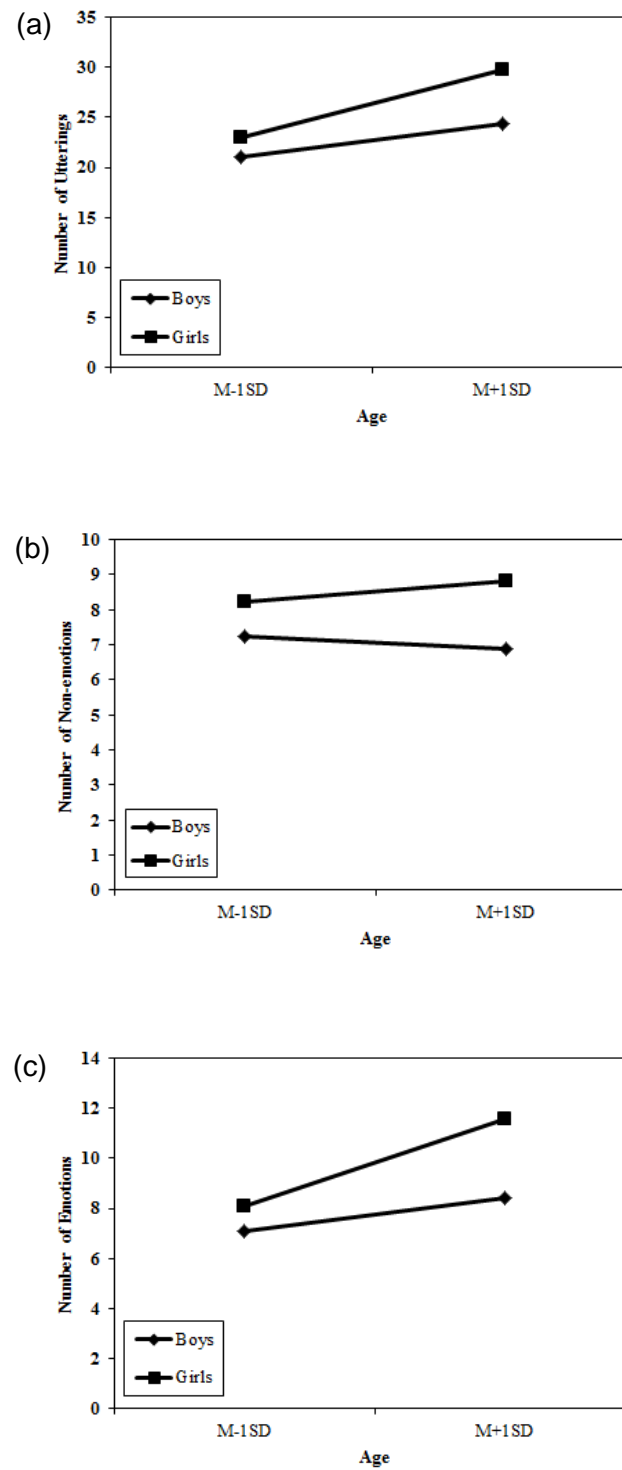


Figure 1. Number of utterings (a), number of non-emotions (b) and number of emotions (c) for boys and girls and for age.

STUDY 2: THE DIMENSIONAL REPRESENTATION OF PERCEIVED SIMILARITIES BETWEEN EMOTION TERMS

The similarity sorting task is one of the most commonly used methods to study the cognitive representation of the emotion domain (e.g., Russell & Bullock, 1986; Shaver et al., 1987). In this task, emotion terms are sorted in piles of similarity without priming any emotion feature. Despite its frequent use in the literature, none of the previous studies has ever revealed a novelty dimension. It is possible, though, that methodological limitations of the similarity sorting task have prevented the novelty dimension to emerge.

There are at least three such possible limitations. A first limitation is mutual dependency. The pairwise similarity is calculated as the frequency with which a pair of words is sorted into the same pile. This frequency does not only depend on the perceived similarity between the two words but also on the other words that are included in the similarity task. For instance, the unpredictability aspect implied by the emotion term *shocked* might have gone unnoticed as it is likely to be sorted in a pile with fear-related terms such as *anxiety*. A second limitation is the partial lack of differentiation. Emotion terms that are closely related in meaning are likely to be sorted in the same pile. However, when terms are not sorted in the same pile, it can both mean that they are unrelated or have an opposite meaning. A third limitation is unreliability. The less reliable the observed similarities, the less likely multidimensional scaling (MDS) techniques will identify the actual dimensionality of the domain.

A similarity rating task can overcome these limitations. In a similarity rating task each pair of terms is rated on a response scale. Hence, there is no structural dependency between the pairwise similarities. Because a response scale is used, it is also possible to differentiate between terms that are unrelated in meaning and terms that have an opposite meaning. Moreover, the reliability of the similarity ratings can be investigated in a classical way. Possible problems with the reliability of the data can be easily detected before structural analyses are performed. The second study therefore uses a similarity rating task to investigate the cognitive structure of the emotion domain across children, adolescents, students and adults.

METHOD

Pairwise similarity rating task

A list of 85 Dutch terms³ was constructed by the following procedure. First, the 74 emotion terms identified in the previous free-listing study were included. Second, we compared this set with the GRID terms used in the study of Fontaine et al. (2007). Only 2 out of the 24 GRID terms were not represented (see Table 1), namely *walging* (disgust) and *minachting* (contempt), and were added. Third, nine marker feeling terms were added to clarify the interpretation of the emotion dimensions, namely *goed* (good) and *slecht* (bad) for the valence dimension, *sterk* (strong) and *zwak* (weak) for the power dimension, and *nerveus* (nervous), *actief* (active), *ontspannen* (relaxed) and *rustig* (calm) for the arousal dimension. Moreover, *vol van energie* (full of energy) was added as separate though closely in meaning-related feeling term for *actief* (active). For the novelty dimension, no marker feeling terms could be identified. All terms were presented in their adjective forms. For 15 out of the 85 terms, no adjective form existed in Dutch, so these terms were presented with the qualifier “full of” (i.e., *vertrouwen* (trust) was replaced by *vol van vertrouwen* (full of trust); see Table 3).

Combining all 85 terms with each other resulted in 3570 possible pairs. Because it was not feasible for a single participant to rate all pairs, 14 lists were created. Each list consisted of 307 pairs with 56 pairs that were included in all 14 lists - and formed a common base across all participants⁴ - and 251 unique pairs that were randomly selected from the 3514 remaining pairs. The overlapping pairs were made by mutual combinations of the emotion terms *bang* (afraid), *boos* (angry), *blij* (joyful), *verdrietig* (sad), *eenzaam* (lonely), *vol van liefde* (full of love), *geïrriteerd* (irritated) and *zenuwachtig* (flustered) with the marker terms *goed* (good), *slecht* (bad), *sterk* (strong), *zwak* (weak), *nerveus* (nervous), *actief* (active), *ontspannen* (relaxed) and *rustig* (calm).

³ No additional terms were selected because for each added term the pairwise similarities with all other terms had to be rated. Adding terms would have affected the feasibility of the pairwise similarity rating task.

⁴ A common base of terms was needed for technical reasons. In order to do MDS analyses with data from individual participants, some pairs had to be present for all participants.

Participants

In total 1239 respondents participated on a voluntary and anonymous basis. Participants who made few differentiations were excluded from the final analyses (i.e., when they used the same response category in more than 90% of their responses). Using this criterion, 20 children and adolescents, 5 students and 30 adults were removed. The remaining 1184 respondents, consisted of 270 children and adolescents (54.1% female, $M_{\text{age}} = 11.93$, $SD_{\text{age}} = 1.94$), 173 students (86.1% female, $M_{\text{age}} = 20.12$, $SD_{\text{age}} = 3.06$) and 741 adults (48.9% female, $M_{\text{age}} = 38.50$, $SD_{\text{age}} = 12.32$). The child-adolescent sample consisted of primary (61.1%) and secondary (38.9%) schoolchildren. The student sample consisted of exclusively psychology students. In the adult sample, all education levels were represented (50.3% low, 22.0% middle and 27.7% high educated adults).

Procedure

Recruitment of the child-adolescent sample and the adult sample was made by psychology students of Ghent University for course credits. Students informed and encouraged eligible participants in their close environment to participate in the study. The student sample consisted of the psychology students who recruited the child-adolescent and adult samples. They were invited to participate anonymously in this study (without obligation and without receiving a reward). Upon agreement, participants (children, adolescents, adults and students) were directed to a protected web page on which they first had to declare their informed consent. After a few demographic characteristics, 1 of the 14 lists was randomly assigned. The participants had to rate on an implicit bipolar 6-point response scale (*do not at all agree* to *fully agree*; Russell & Carroll, 1999) to which extent they agreed that the terms of each pair were alike (for example *jealous and hurt are alike*). Pairs were shown on separate screens and rated one by one.

RESULTS

Reliability of the similarities

The pairwise similarity judgements across the 307 pairs of terms for the 14 administered lists were reliable. Average Cronbach's α s ranged from .98 for the

adult sample over .94 for the student sample⁵ to .83 for the child-adolescent sample, with an average value of .98 across all respondents and versions.

Selection of the most parsimonious dimensionality

The dimensional representation was first investigated for the complete sample. Configurations were computed using non-metrical MDS on the average similarities across all respondents with the PROXCAL procedure of SPSS statistics 19. In MDS, the emotion terms are represented as points in a geometrical space in such a way that the distances between the points reflect the empirical similarities between the terms as accurately as possible. The dimensionality was selected by an examination of the fit indices, the scree plot and the interpretability (e.g., Borg & Groenen, 1997).

The proportion of variance in the observed average similarities accounted for by the distances in a one- up to a ten-dimensional configuration was .64, .75, .83, .87, .90, .91, .92, .93, .93 and .94, respectively. As each respondent evaluated 307 of the 3570 pairs, it was also possible to investigate the fit of the dimensional representation with respect to the similarity ratings of each individual participant. A one- up to a ten-dimensional representation accounted on average for .30%, .35%, .38%, .40%, .41%, .42%, .42%, .43%, .43%, and .43%, respectively, of the individual similarity ratings. The scree plot gave no unequivocal indication for the dimensionality of the configuration since there was no clear inflexion point.

The a priori expected four-dimensional structure fitted the data well. It accounted for 87% of the average similarities and on average for 40% of the individual similarity ratings. From the fifth to the tenth dimension, mainly single words or pairs of words were further differentiated, namely *beschaamd* (ashamed), *schuldig* (guilty), *trots* (proud), *fier* (proud), *onschuldig* (innocent), *verveeld* (bored), *opgelucht* (relieved), *nieuwsgierig* (curious) and *hopeloos* (hopeless). Therefore, we restricted our attention to one-, two-, three- and four-dimensional representations of the similarities.

Interpretation of the dimensions

⁵ Preliminary results of the student sample have been reported elsewhere (Fontaine & Veirman, 2013).

As predicted, the dimensions in the four-dimensional representation could be interpreted as valence, power, arousal, and novelty. The first valence dimension opposed emotion terms from *vrolijk* (cheerful) to *ontevreden* (dissatisfied) (see Table 3).⁶ All marker items were differentiated on this dimension with *ontspannen* (relaxed), *goed* (good), *rustig* (calm), *actief* (active), *vol van energie* (full of energy), and *sterk* (strong) on the positive side, and *slecht* (bad), *zwak* (weak), and *nervus* (nervous) on the negative side. The second power dimension opposed emotion terms from *furieus* (furious) to *verlegen* (shy). With respect to the marker items, *sterk* (strong) and *zwak* (weak) were the most strongly contrasted. The third dimension represented the arousal dimension with the most differentiating marker items being *ontspannen* (relaxed), *rustig* (calm), and *nervus* (nervous).⁷ *Ongeduldig* (impatient) and *zenuwachtig* (flustered) were most opposed to *onschuldig* (innocent) and *minachting* (contempt) on this dimension. For the final novelty dimension, all surprise terms (i.e., *verrast* (surprised), *verwonderd* (amazed), *gechoqueerd* (shocked), *geschrokken* (scared), and *verbaasd* (astonished) were situated at the positive pole, whereas for instance the terms *verveeld* (bored), *eenzaam* (lonely), and *jaloers* (jealous) were located at the negative pole. No marker items showed the highest or second highest coordinate on this dimension. Moreover, a comparison of the four-dimensional representation with the one- up to the three-dimensional representation showed that only valence is represented in the one-dimensional representation ($r_{\text{valence4_valence1}} = .983$), only valence and power are represented in the two-dimensional representation ($r_{\text{valence4_valence2}} = .992$ and $r_{\text{power4_power2}} = .957$, respectively), and valence, power and a combination of arousal and novelty are represented in the three-dimensional representation ($r_{\text{valence4_valence3}} = .997$, $r_{\text{power4_power3}} = .986$, $r_{\text{arousal4_arousal3}} = .881$ and $r_{\text{novelty4_arousal3}} = .322$, respectively).

⁶ To investigate whether the marker terms themselves had an influence on the emotion structure, a four-dimensional structure was computed on only the 76 emotion terms. After orthogonal Procrustes rotation the dimensions of this 76-words structure correlated .999, .997, .994, and .966, respectively, with the dimensions of the 85-words structure. This implies that the reported four-dimensional structure is not affected by the inclusion of the marker terms.

⁷ Contrary to the expectation, both *actief* (active) and *vol van energie* (full of energy) showed higher coordinates on the power and valence dimension than on the arousal dimension.

Table 3

Coordinates of the 85 Terms in a Four-Dimensional Representation

Dutch term	English translation	Dim1	Dim2	Dim3	Dim4
vrolijk	cheerful	-.79	-.11	-.01	.02
vol van plezier	full of pleasure	-.79	-.09	-.01	.09
vol van geluk	full of bliss	-.78	.02	-.01	-.02
content	content	-.78	-.05	-.07	-.11
vol van vreugde	delighted	-.78	-.10	.00	-.02
tevreden	satisfied	-.78	.00	-.12	-.08
blij	joyful	-.77	-.03	-.02	.01
gelukkig	happy	-.77	-.02	-.05	-.06
<u>ontspannen</u>	<u>relaxed</u>	-.74	.08	<u>-.31</u>	-.22
euforisch	euphoric	-.73	-.25	.15	-.05
vol van vertrouwen	full of trust	-.73	-.12	-.10	-.32
opgewekt	lively	-.73	-.13	.13	.00
enthousiast	enthusiastic	-.73	-.14	.14	.10
<u>goed</u>	<u>good</u>	-.72	.14	-.12	.00
fier	proud	-.71	-.26	-.16	-.20
opgelucht	relieved	-.69	-.03	-.39	.01
trots	proud	-.67	-.26	-.19	-.15
vol van liefde	full of love	-.65	.17	.09	-.10
hoopvol	hopeful	-.65	.10	.13	-.25
geïnteresseerd	interested	-.63	.13	.28	.20
<u>vol van energie</u>	<u>energetic</u>	-.60	-.32	<u>.12</u>	.02
<u>rustig</u>	<u>calm</u>	-.58	.25	<u>-.39</u>	-.35
verliefd	in love	-.57	.12	.23	-.06
<u>actief</u>	<u>active</u>	-.55	-.36	<u>.20</u>	.06
<u>sterk</u>	<u>strong</u>	-.53	<u>-.37</u>	-.15	.00
vol van verlangen	longing	-.50	.02	.26	-.28
bang	afraid	.38	.33	.38	.04
vol van twijfel	doubtful	.41	.37	.27	.09
angstig	fearful	.44	.24	.38	.11
vervelend	uncomfortable	.45	-.24	.32	-.44
triest	triste	.46	.29	-.25	-.12
vol van walging	disgusted	.46	-.41	-.41	.28
vol van spijt	full of regret	.47	.45	-.20	.25
kwaad	mad	.47	-.37	-.02	.15
droevig	sorrowful	.48	.33	-.25	-.08
verdrietig	sad	.48	.31	-.17	-.04
hopeloos	hopeless	.48	.27	.09	-.34
treurig	mournful	.48	.34	-.23	-.11
geïrriteerd	irritated	.48	-.35	.23	-.07
gekwetst	hurt	.49	.06	-.21	.10
teleurgesteld	disappointed	.50	.09	-.42	-.01
wanhopig	desperate	.50	.29	.18	-.22
boos	angry	.51	-.37	-.09	.10

Note: For each emotion term and marker term the highest absolute coordinate is placed in boldface. For each marker term the expected highest absolute coordinate is underlined.

Table 3 (continued)

Coordinates of the 85 Terms in a Four-Dimensional Representation

Dutch term	English translation	Dim1	Dim2	Dim3	Dim4
ontgoocheld	disillusioned	.51	.13	-.36	.09
schuldig	guilty	.51	.04	.37	.48
gefrustreerd	frustrated	.52	-.20	.12	-.03
ongelukkig	unhappy	.57	.13	-.12	-.13
neerslachtig	dejected	.58	.27	-.09	-.17
<u>slecht</u>	<u>bad</u>	.58	-.32	-.13	-.22
depressief	depressed	.60	.20	-.01	-.31
ontevreden	dissatisfied	.62	-.06	-.12	-.11
furieus	furious	.28	-.60	.01	.27
razend	raging	.40	-.58	-.02	.22
vol van haat	full of hate	.47	-.57	-.24	-.02
woest	fuming	.44	-.54	-.05	.18
nijdig	cross	.44	-.53	.05	-.05
woedend	infuriated	.43	-.50	.02	.20
chagrijnig	miserable	.48	-.48	.07	-.23
afgunstig	envious	.41	-.42	-.30	-.34
bezorgd	worried	.06	.41	.30	.19
<u>zwak</u>	<u>weak</u>	.36	.50	.10	-.28
ontroerd	moved	-.24	.50	-.28	.02
vol van medeleven	full of sympathy	-.31	.61	-.16	.10
beschaamd	ashamed	.26	.61	.12	.37
vol van medelijden	full of compassion	.01	.63	-.36	.30
verlegen	shy	-.05	.65	.33	-.12
onschuldig	innocent	-.29	.26	-.60	.07
vol van minachting	full of contempt	.39	-.39	-.55	-.11
gestresseerd	stressed	.27	-.15	.48	-.01
ongerust	anxious	.32	.22	.49	.06
nieuwsgierig	curious	-.48	.02	.53	.15
<u>nerveus</u>	<u>nervous</u>	.17	-.08	.54	.10
zenuwachtig	flustered	.07	-.03	.54	.00
ongeduldig	impatient	.08	-.24	.55	-.19
verveeld	bored	.38	-.07	.20	-.61
vol van heimwee	homesick	.20	.44	-.05	-.51
eenzaam	lonely	.36	.31	-.20	-.46
jaloers	jealous	.37	-.39	.05	-.40
verward	confused	.30	.19	.22	.33
verontwaardigd	indignant	.34	-.05	-.34	.38
verrast	surprised	-.45	-.05	.03	.49
verwonderd	amazed	-.35	.06	-.12	.55
gechoqueerd	shocked	.30	-.12	-.20	.55
geschrokken	scared	.19	.08	.04	.60
verbaasd	astonished	-.14	.12	-.11	.62

Note: For each emotion term and marker term the highest absolute coordinate is placed in boldface. For each marker term the expected highest absolute coordinate is underlined.

Differences in fit of the dimensional representation between and within samples

For each of the three samples separately, average similarities were computed and an MDS with four dimensions was executed. For each participant, the difference in fit of the sample-specific structure and the overall structure was computed. Three one-sample *t*-tests showed no significant difference in fit for the adult sample, $M_{\text{difference}} = -0.0005$, $t(740) = -1.22$, $p = .22$; a minor difference in fit for the student sample, $M_{\text{difference}} = 0.0042$, $t(172) = 2.69$, $p < .01$, with the total structure fitting slightly better than the sample specific structure; and no significant difference in fit for the child-adolescent sample, $M_{\text{difference}} = 0.0021$, $t(269) = 1.06$, $p = .29$. Thus, the overall structure did either not differ in fit or fitted even slightly better than the sample-specific structures.

Three analyses of variance (ANOVAs) were performed to examine differences in fit of the four-dimensional solution within samples with respect to gender (all samples), age (child-adolescent sample and adult sample) and education level (adult sample). For the child-adolescent sample, a significant effect of age in favor of older children was observed, $F(5, 258) = 5.50$, $p < .001$ (partial $\eta^2 = .10$). There was no significant effect of gender, $F(1, 258) = .12$, $p = .73$, and no significant interaction effect of age and gender, $F(5, 258) = .73$, $p = .60$. For the student sample, there was no significant effect of gender, $F(1, 171) = .02$, $p = .90$. For the adult sample, there was a significant effect of age in favor of older participants, $F(1, 732) = 4.95$, $p < .05$, but the size of that effect was very small (partial $\eta^2 < .01$). There was no significant effect of gender, $F(1, 732) = 1.28$, $p = .26$. We observed a significant but small effect of education in favor of higher educated adults, $F(3, 732) = 4.99$, $p < .01$ (partial $\eta^2 = .02$). The interaction effect between gender and education was not significant, $F(3, 732) = .19$, $p = .90$.

Differences in salience of the dimensions between and within samples

We further investigated whether participants in each of the three samples differed with respect to the salience of each of the four dimensions (i.e., how important each dimension is in determining the similarity judgements between the emotion terms). We executed a weighted non-metrical MDS across all respondents with the PROXCAL procedure of SPSS statistics 19. In this analysis, the weights of

each of the four dimensions were allowed to vary from participant to participant.⁸ The higher a dimension weight the higher its salience. It is important to note that the weights generated by the weighted MDS are not independent from one another. If the weight of one dimension increases, the weights of one or more of the other dimensions will tend to decrease. Four ANOVAs showed a significant difference between samples in the salience of valence ($M_{\text{child-adolescent sample}} = 2.757$; $M_{\text{student sample}} = 3.103$; $M_{\text{adult sample}} = 3.091$), $F(2, 1181) = 77.00$, $p < .001$ (partial $\eta^2 = .12$), power ($M_{\text{child-adolescent sample}} = 3.703$; $M_{\text{student sample}} = 3.513$; $M_{\text{adult sample}} = 3.513$), $F(2, 1181) = 16.77$, $p < .001$ (partial $\eta^2 = .03$), arousal ($M_{\text{child-adolescent sample}} = 4.127$; $M_{\text{student sample}} = 3.883$; $M_{\text{adult sample}} = 3.807$), $F(2, 1181) = 34.66$, $p < .001$ (partial $\eta^2 = .06$), and novelty ($M_{\text{child-adolescent sample}} = 4.104$; $M_{\text{student sample}} = 3.795$; $M_{\text{adult sample}} = 3.842$), $F(2, 1181) = 20.17$, $p < .001$ (partial $\eta^2 = .03$). Post hoc tests showed that these differences were situated between the child-adolescent sample on the one hand and the student and adult samples on the other hand. There were no significant differences between the student and the adult sample. In general, the relative salience of the valence dimension is increasing, while the relative salience of the other three dimensions is decreasing from childhood to adulthood.

Finally, a series of simple regression analyses was performed to examine differences in the salience of the four dimensions within samples with respect to gender (all samples), age (child-adolescent sample and adult sample) and education level (adult sample) (see Table 4). In none of the samples, gender made a contribution to predicting the salience of the four dimensions. For the child-adolescent sample, age was a significant predictor for the salience of valence, power, arousal and novelty. In line with the differences between samples, older participants showed a higher salience of valence and a lower salience of power, arousal and novelty. In the adult sample, older participants showed a slightly lower salience of arousal. Moreover, higher education was significantly related to a slightly higher salience of valence and lower salience of arousal.

⁸ The coordinates of the replicated MDS were used as the coordinates of the overall structure in the weighted MDS.

Table 4

Simple Regression Analyses on the Salience of Valence, Power, Arousal, and Novelty in the Three Samples

Sample	Variable	Valence		Power		Arousal		Novelty	
		β	t	β	t	β	t	β	t
Child-adolescent sample	Age	.22	3.63***	-.14	-2.18*	-.18	-2.98**	-.16	-2.53*
	Gender	.01	.14	-.00	-.02	-.03	-.41	.07	1.12
	R^2		.05		.02		.04		.03
	F		6.99**		2.48		4.97**		3.40*
Student sample	Gender	-.10	-1.33	.09	1.18	.11	1.46	.05	.59
	R^2		.01		.01		.01		.00
	F		1.77		1.40		2.12		.35
Adult sample	Age	.03	.77	.00	.02	-.10	-2.76**	-.01	-.38
	Gender	.04	1.04	.01	.13	-.04	-1.08	-.06	-1.54
	Middle educated	.05	1.19	.01	.16	-.06	-1.55	-.02	-.42
	High educated	.11	2.71**	-.05	-1.16	-.11	-2.80**	-.05	-1.18
	R^2		.13		.00		.02		.01
	F		2.39*		.43		4.49**		1.03

Note: Education was represented as two dummy variables, middle and high educated, with the low educated group serving as the reference group.

* $p < .05$. ** $p < .01$. *** $p < .001$.

DISCUSSION

The present research aimed at investigating the status of the recently identified novelty dimension in the GRID research. A first free-listing study identified the emotion terms that came most readily to mind in an extensive middle childhood up to early adulthood sample. A subsequent similarity rating study identified the cognitive representation of the emotion domain in children, adolescents, students, and adults without priming emotion features.

Surprise terms and novelty

The free-listing study showed that 7% of the most frequently reported emotion terms by a middle childhood up to early adulthood sample shared a surprise-related meaning (i.e., *astonished*, *scared*, *surprised*, *amazed* and *shocked*) and that 24.6% of the respondents mentioned at least one of these surprise terms. This is in line with previous free-listing research in which the emotion term *surprise* was on average reported by 19.5% of English, Dutch, French and Italian speaking psychology students in seven countries (Fehr & Russell, 1984; Van Goozen & Frijda, 1993). Since only 4% of the terms had a surprise-related meaning in the GRID research (i.e., *surprise*), the emergence of the novelty dimension cannot be attributed to an overrepresentation of surprise-related emotion terms in the GRID research.

The similarity rating study also showed that the emergence of novelty in the GRID research was neither elicited by a disproportionate representation of novelty-related features nor by the reliance on student samples. Here we find that novelty even emerged when no emotion features are primed. Moreover, this dimension is not only observed in the typical student sample but also in the child-adolescent sample and the adult sample including participants with varying education levels.

The finding of a novelty dimension fits both basic emotion theories and appraisal emotion theories. There is a long-standing tradition in basic emotion research to consider surprise as a separate basic emotion (e.g., Ekman & Friesen, 1971; Ekman, Friesen, & Ellsworth, 1982; Izard, 1977; McDougall, 1926; Plutchik, 2002; Tomkins, 1984). The emergence of a separate dimension on which surprise terms are differentiated highlights the distinctiveness of surprise in the emotion domain. According to the major appraisal theories, the appraisal of

novelty (also referred to as for instance suddenness, change, familiarity, or unexpectedness) plays a central role in the appraisal system (e.g., Frijda, 1986; Roseman, 1984; Roseman, Spindel, & Jose, 1990; Scherer, 1984, 2009; Smith & Ellsworth, 1985; and for a recent overview Moors, Ellsworth, Scherer, & Frijda, 2013). Our research demonstrated that novelty is not only a specific dimension in the appraisal system but also more generally affects how emotions are cognitively structured. In line with Mandler's (1975) theorizing, the current research finds evidence for the central role of novelty in the emotion domain.

Interpersonal terms and power

The current investigation also sheds some light on the power and arousal dimensions. When the data were represented in a two-dimensional solution, only valence and power emerged. Also in previous research on the connotative meaning (Osgood et al., 1975) and in the GRID research (Fontaine et al., 2007; Fontaine & Scherer, 2013) power emerged as the second dimension. The inclusion of explicit interpersonally oriented emotion terms in the current research may have contributed to the emergence of power as the second dimension and arousal as the third dimension (e.g., *full of hate* and *full of compassion* are highly differentiated on this dimension). Nevertheless, there was no overrepresentation of these interpersonal terms, as they were empirically selected on the basis of an extensive free-listing task. Moreover, only 15% of the selected emotion terms were explicitly interpersonally oriented, and some of these terms had higher coordinates (in absolute values) on the arousal than on the power dimension (e.g., *in love*). So these interpersonally oriented terms also contributed to the emergence of the arousal dimension. As especially anger-related terms are differentiated on the power dimension, it can be hypothesized that differentiating fear and sadness from anger is cognitively more fundamental than differentiating low- from high-aroused emotion terms.

Age and gender

The findings with respect to age can be interpreted in terms of the classic developmental concepts of differentiation and integration (e.g., Werner, 1957), which recently gained renewed interest in developmental research on cognitive change (e.g., Siegler & Chen, 2008). Differentiation refers to the process of

distinguishing entities that were not distinguished before (through for example explanation, cumulative experiences, or a single dramatic experience). Integration represents the combining of entities into a problem-solving approach (such as a strategy, an algorithm, or a rule). Our free-listing research illustrates that the number and range of emotion terms broaden and become more fine-grained as children grow older. Furthermore, the similarity rating study showed more reliable pairwise similarities for adults and students than for children and adolescents and an age effect within the children and adolescent sample with older participants representing the emotion terms more accurately along the four dimensions. Moreover, the fact that the differences in fit between the sample-specific representations and the overall four-dimensional representation were negligible indicates that people become more accurate along the lines of the same four dimensions as they grow older, that is, they get better in distinguishing the relations between emotion concepts. These more complex and accurate emotion representations thus point to an increased differentiation.

The weighted MDS revealed a robust, but counter-intuitive effect: the relative salience of valence increased compared to the relative salience of the other three dimensions among older participants.⁹ This is the first study to observe this age effect. To the best of our knowledge, there is only one study in the domain of dimensional emotion research that addressed the same issue in the past. In a study among 8- to 12-year-old children, Russell and Ridgeway (1983) found no differences between the younger and older children with respect to the salience of valence and arousal. They, however, used a less sensitive similarity sorting task. In the current study, the increased salience of valence compared to the other three dimensions is a robust finding. It is both observed within the child-adolescent sample and when comparing the child-adolescent sample with the student and adult samples. It is a counter-intuitive finding, though, as one may have expected that with increased differentiation higher dimensions are not only used more accurately but also become more salient in differentiating emotion terms. Yet, this finding fits the robust phenomenon in

⁹ As the dimension weights generated by the weighted MDS are not independent from one another, the current findings do not mean that older participants use power, arousal and novelty less than younger participants, but that they use these dimensions less compared to valence.

emotion research that valence is a basic building block of our emotional life (e.g., Barrett, 2006). The current finding could mean that as children and adolescents grow older they start to understand better how at first sight very different emotion processes, such as for instance fear and sadness, resemble one another in terms of their hedonic tone. Developmentally, this observation could then be interpreted as a cognitive integration of the emotion domain along the valence dimension. Further research is needed to clarify this unexpected developmental phenomenon.

For the gender differences a more complex picture emerged. Although girls reported more emotion terms and emotion-related utterings than boys - a difference that increased with age - we found no gender differences at all in accuracy of the cognitive representation, nor did we find gender differences in the salience of the four dimensions, even not in the large adult sample. This means that we can exclude gender differences in underlying cognitive ability in the emotion domain as an explanation for why women report more emotion terms and emotion-related utterings. Social expectations, personality, and interests form more likely explanations. Culture and society promote specific gender stereotypes of the way boys and girls are expected to deal with their emotions. Girls are tuned towards more excitable and emotionally-oriented behavior, whereas this type of behavior is less socially accepted for boys, who ought to be tough and reserved (e.g., Best, 2010). Cross-cultural research among 55 nations also showed that women generally express more neuroticism, extraversion, agreeableness, and conscientiousness than men (Schmitt, Realo, Voracek, & Allik, 2008). Moreover, women tend to be more interested in people/family-oriented careers, whereas men are more interested in things/ideas-oriented careers (Wai, Lubinski, & Benbow, 2005). The absence of gender differences in the dimensional representation supports the robustness of the four-dimensional structure.

It can be concluded that the current research further substantiates the evidence for a fourth novelty dimension in the cognitive representation of the emotion domain. The novelty dimension is also observable in children and adolescents and in men and women from different walks of life using a simple similarity rating task with a representative set of emotion terms.

REFERENCES

- Barrett, L. F. (2006). Valence as a basic building block of emotional life. *Journal of Research in Personality, 40*, 35-55. doi:10.1016/j.jrp.2005.08.006
- Bernard, H. R. (2006). Structured interviewing II: Cultural domain analysis. In H. R. Bernard (Ed.), *Research methods in anthropology, qualitative and quantitative methods* (4th ed., pp. 299-317). Walnut Creek, CA: Altamira Press.
- Best, D. L. (2010). The contributions of the Whittings to the study of the socialization of gender. *Journal of Cross-Cultural Psychology, 41*, 534-545. doi:10.1177/0022022110362570
- Borg, I., & Groenen, P. J. F. (1997). *Modern multidimensional scaling: Theory and applications*. New York, NY: Springer.
- Ekman, P. (1972). Universals and cultural differences in facial expressions of emotions. In J. R. Cole (Ed.), *Nebraska symposium on motivation* (pp. 207-283). Lincoln: University of Nebraska Press.
- Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology, 17*, 124-129. doi:10.1037/h0030377
- Ekman, P., Friesen, W. V., & Ellsworth, P. C. (1982). What emotion categories or dimensions can observers judge from facial behavior? In P. Ekman (Ed.), *Emotion in the human face* (pp. 39-55). Cambridge: Cambridge University Press.
- Fehr, B., & Russell, J. A. (1984). Concept of emotion viewed from a prototype perspective. *Journal of Experimental Psychology, 113*, 464-486. doi:10.1037/0096-3445.113.3.464
- Fontaine, J. R. J., Poortinga, Y. H., Setiadi, B., & Suprpti, S. M. (2002). Cognitive structure of emotion in terms of Indonesia and The Netherlands. *Cognition and Emotion, 16*, 61-86. doi:10.1080/02699933014000130
- Fontaine, J. R. J., & Scherer, K. R. (2013). The global meaning structure of the emotion domain: Investigating the complementarity of multiple perspectives on meaning. In J. R. J. Fontaine, K. R. Scherer, & C. Soriano (Eds.), *Components of emotional meaning: A sourcebook* (pp. 106-125). Oxford: Oxford University Press.

- Fontaine, J. R. J., Scherer, K. R., Roesch, E., & Ellsworth, P. (2007). The world of emotions is not two-dimensional. *Psychological Science*, 18, 1050-1057. doi:10.1111/j.1467-9280.2007.02024.x
- Fontaine, J. R. J., & Veirman, E. (2013). The new novelty dimension: Method artifact or basic dimension in the cognitive structure of the emotion domain. In J. R. J. Fontaine, K. R. Scherer, & C. Soriano (Eds.), *Components of emotional meaning: A sourcebook* (pp. 233-242). Oxford: Oxford University Press.
- Frijda, N. H. (1986). *The emotions*. Cambridge: Cambridge University Press.
- Gehm, T., & Scherer, K. R. (1988). Factors determining the dimensions of subjective emotional space. In K. R. Scherer (Ed.), *Facets of emotion: Recent research* (pp. 99-114). Hillsdale, NJ: L. Erlbaum Associates.
- Izard, C. E. (1977). *Human emotions*. New York, NY: Plenum Press.
- Kitayama, S., Markus, H. R., & Kurokawa, M. (2000). Culture, emotion, and well-being: Good feelings in Japan and the United States. *Cognition and Emotion*, 14, 93-124. doi:10.1080/026999300379003
- Mandler, G. (1975). *Mind and emotion*. New York, NY: Wiley.
- McDougall, W. (1926). *An introduction to social psychology*. Boston, MA: Luce.
- Moors, A., Ellsworth, P. C., Scherer, K. R., & Frijda, N. H. (2013). Appraisal theories of emotion: State of the art and future development. *Emotion Review*, 5, 119-124. doi:10.1177/1754073912468165
- Osgood, C. E., May, W. H., & Miron, M. S. (1975). *Cross-cultural universals in affective meaning*. Urbana: University of Illinois Press.
- Plutchik, R. (2002). *Emotions and life: Perspectives from psychology, biology, and evolution*. Washington, DC: American Psychological Association.
- Roseman, I. J. (1984). Cognitive determinants of emotions: A structural theory. In P. Shaver (Ed.), *Review of personality and social psychology: Emotions, relationships, and health* (pp. 11-36). Beverly Hills, CA: Sage.
- Roseman, I. J., Spindel, M. S., & Jose, P. E. (1990). Appraisals of emotion-eliciting events: Testing a theory of discrete emotions. *Journal of Personality and Social Psychology*, 59, 899-915. doi:10.1037/0022-3514.59.5.899
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, 39, 1161-1178. doi:10.1037/h0077714

- Russell, J. A. (1991). Culture and the categorization of emotions. *Psychological Bulletin*, 110, 426-450. doi:10.1037/0033-2909.110.3.426
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, 110, 145-172. doi:10.1037/0033-295X.110.1.145
- Russell, J. A., & Bullock, M. (1986). On the dimensions preschoolers use to interpret facial expressions of emotion. *Developmental Psychology*, 22, 97-102. doi:10.1037/0012-1649.22.1.97
- Russell, J. A., & Carroll, J. M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin*, 125, 3-30. doi:10.1037/0033-2909.125.1.3
- Russell, J. A., & Ridgeway, D. (1983). Dimensions underlying children's emotion concepts. *Developmental Psychology*, 19, 795-804. doi:10.1037/0012-1649.19.6.795
- Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K.R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 293-317). Hillsdale, NJ: Erlbaum.
- Scherer, K. R. (2009). The dynamic architecture of emotion: Evidence for the component process model. *Cognition and Emotion*, 23, 1307-1351. doi:10.1080/02699930902928969
- Schmitt, D. P., Realo, A., Voracek, M., & Allik, J. (2008). Why can't a man be more like a woman? Sex differences in big five personality traits across 55 cultures. *Journal of Personality and Social Psychology*, 94, 168-182. doi:10.1037/0022-3514.94.1.168
- Shaver, P. R., Schwartz, J. C., Kirson, D., & O'Conner, C. (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology*, 52, 1061-1086. doi:10.1037/0022-3514.52.6.1061
- Shaver, P. R., Wu, S., & Schwartz, J. C. (1992). Crosscultural similarities and differences in emotion and its representation: A prototype approach. In M. S. Clark (Ed.), *Review of personality and social psychology* (Vol. 13, pp. 175-212). Thousand Oaks, CA: Sage.
- Siegler, R. S., & Chen, Z. (2008). Differentiation and integration: Guiding principles for analyzing cognitive change. *Developmental Science*, 11, 433-448. doi:10.1111/j.1467-7687.2008.00689.x

- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48, 813-838. doi:10.1037/0022-3514.48.4.813
- Tomkins, S. S. (1984). Affect theory. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 163-195). Hillsdale, NJ: Erlbaum.
- Van Goozen, S., & Frijda, N. H. (1993). Emotion words used in six European countries. *European Journal of Social Psychology*, 23, 89-95. doi:10.1002/ejsp.2420230108
- Wai, J., Lubinski, D., & Benbow, C. P. (2005). Vocational achievement and creativity among intellectually precocious youth: An age 13 to age 33 longitudinal study. *Journal of Educational Psychology*, 97, 484-492. doi:10.1037/0022-0663.97.3.484
- Werner, H. (1957). The concept of development from a comparative and organismic point of view. In D. B. Harris (Ed.), *The concept of development: An issue in the study of human behavior* (pp. 125-148). Minneapolis: University of Minnesota Press.
- Wundt, W. (1905). *Grundzüge der physiologischen Psychologie [Principles of physiological psychology]* (5th ed.). Leipzig: Engelmann.
- Yik, M. S. M., Russell, J. A., & Barrett, L. F. (1999). Structure of self-reported current affect: Integration and beyond. *Journal of Personality and Social Psychology*, 77, 600-619. doi:10.1037/0022-3514.77.3.600

CHAPTER 5

On the Bipolarity of Emotional Intelligence: A Bottom-up Approach to the Assessment of Ability Emotional Intelligence in Youth¹

Abstract

The scoring of ability emotional intelligence tests, that is, expert and consensus scoring, has been vigorously debated because the link between variation in responses to emotion-related questions and true variation in emotional intelligence remains unclear. So far, no studies attempted to examine raw responses. In the current research, we therefore investigated the internal structure at item level for raw responses of rating-based ability emotional intelligence tests and hypothesized that these responses would be predominantly structured by two factors: a bipolar emotional intelligence factor (on which incorrect items have negative loadings and correct items have positive loadings), and a unipolar acquiescence factor (on which all items have positive loadings). This was investigated in two studies via Procrustes rotations of exploratory factor structures to hypothetical target structures: in Study 1 ($N = 630$) for the rating-based perceiving emotions, facilitating thoughts, and managing emotions tests of the youth version of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT-YV), in Study 2 ($N = 664$) additionally for a rating version of the MSCEIT-YV's understanding test and supplementary sets of items for perceiving emotions, facilitating thoughts, and managing emotions. Procrustes rotations indicated proof for the existence and generalizability of the proposed structure for all rating-based tests. Finally, we examined the implications of these results for the status of emotional intelligence as a standard intelligence. Procrustes

¹ Veirman, E., & Fontaine, J. R. J. (manuscript in preparation). On the bipolarity of emotional intelligence: A bottom-up approach to the assessment of ability emotional intelligence in youth.

weighted component scores for all rating-based tests were factored in a higher-order model with a general emotional intelligence factor and a general acquiescence factor. The nomological network (i.e., intelligence, personality, alexithymia, and social and emotional impairment), and gender and age differences were examined for both the general emotional intelligence factor scores and the general acquiescence factor scores and further supported the interpretation of these factors.

INTRODUCTION

Since the term emotional intelligence entered scientific literature (Salovey & Mayer, 1990), many theories have been proposed at the interface between existing psychological conceptualizations of emotion and intelligence. None of them gained as much attention as Mayer and Salovey's (1997) four-branch model. This model views emotional intelligence as a broad intellectual factor comprising four hierarchically organized branches of emotion-related abilities, each assumed to develop from early childhood onwards: (1) *perceiving* (i.e., accurately identifying emotions in one's self and others' (non-)verbal behavior), (2) *facilitating* (i.e., using emotions to enhance thinking and reasoning), (3) *understanding* (i.e., labeling emotions and recognizing relations and transitions among them), and (4) *managing* (i.e., successfully managing emotions in oneself and in others by maintaining or changing emotions).

Empirical evidence for this model has primarily been gathered from the few available maximum performance measurements that assess these four emotion-related abilities: the Multifactor Emotional Intelligence Scale (MEIS; Mayer, Caruso, & Salovey, 2000), its successor the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002), and a recently developed youth version thereof (MSCEIT-YV; Mayer, Salovey, & Caruso, 2015). These ability emotional intelligence measures differ from traditional intelligence measures in that they cannot rely on rule-bounded standards (such as mathematics, logic, reasoning, and semantics) that unequivocally indicate a correct-incorrect categorization of responses to emotion-related questions (Roberts, Zeidner, & Matthews, 2001). This Achilles' heel has primarily been dealt with by use of two alternative scoring methods. In expert scoring, experts in the field of emotions are consulted to decide upon which responses are correct. The scoring key is here based on what groups of experts in the field agree on. However, experts may still disagree, and there are no hands-on criteria to choose who is an expert on this topic (Matthews, Roberts, & Zeidner, 2004). In this case, consensus scoring provides an attractive alternative. In consensus scoring, correct responses are identified on the basis of what large numbers of non-experts agree on. Thus, the scoring key is based on the responses of a norm group. This approach fits a long-standing research tradition in psychology showing its usefulness for measuring other non-standard

constructs, like emotion perception (Geher, Warner, & Brown, 2001; Mayer, DiPaolo, & Salovey, 1990) and social insight (Legree, 1995). Moreover, this approach has also been applied to standard constructs such as general cognitive ability (Legree, Martin, & Psotka, 2000). It has now been successfully used too in a considerable number of studies in the field of emotional intelligence (e.g., Barchard, Hensley, & Anderson, 2013; Legree, Psotka, Tremble, & Bourne, 2005; Mayer et al., 2000; Mayer, Salovey, & Caruso, 2000; Mayer, Salovey, Caruso, & Sitarenios, 2003; Zeidner, Shani-Zinovich, Matthews, & Roberts, 2005), and is currently seen as the closest approximation of correct answers in ability emotional intelligence measurement. Yet, despite its frequent use, it has been claimed that this type of scoring may not be a valid way of scoring intelligence items (Matthews et al., 2004). Other criteria (i.e., conceptual, correlational, and developmental) have been put forward to decide on the legitimacy of ability emotional intelligence as a form of intelligence (Mayer et al., 2000). In this context, Maul (2012a) recently called for a shift in focus towards causal explanations of item responses by considering an explanatory approach to the assessment of emotional intelligence. He argued that the application of current scoring techniques has prevented emotional intelligence theorists from attempting to clarify how variation in emotional intelligence may result in variation in specific item responses (Maul, 2012b).

In the footsteps of these recommendations, the present research proposes an alternative framework to the traditional consensus scoring. In traditional consensus scoring, various algorithms (i.e., proportion, mode, lenient mode, distance, adjusted distance) are used to score ability emotional intelligence tests and calculate the overall match between a person's set of responses and the identified scoring key (for an overview, see MacCann, Roberts, Matthews, & Zeidner, 2004). To our knowledge, no efforts have been made within the field of ability emotional intelligence to examine raw responses without applying consensus or other forms of scoring. Furthermore, there is a scarcity of studies that focus on an omnibus test of the four-branch emotional intelligence model in younger people. This type of research may be of particular importance because the developmental status of ability emotional intelligence has still to be precisely identified (Peters, Kranzler, & Rossen, 2009; Rivers et al., 2012). The current research therefore sought to address these gaps in the

literature via a bottom-up examination of the internal structure of raw responses of rating-based ability emotional intelligence tests in youth in two studies: a first study is focussed on the MSCEIT-YV rating-based tests (*perceiving*, *facilitating*, and *managing*), a second study is additionally focussed on a rating version of the MSCEIT-YV multiple choice *understanding* test and supplementary sets of items for *perceiving*, *facilitating*, and *managing*. The strength and immediately also the primary purpose of taking this approach is to identify the structure inherent in the raw data, without potential restraints imposed by scoring methodologies.

We begin with an overview of how the structure of ability emotional intelligence at item level can be conceived. Within this first part, we propose a bipolar emotional intelligence factor. We then identify acquiescence and multidimensionality as potential confounding variables. We close by discussing conceptual, correlational, and developmental criteria that are used to decide on ability emotional intelligence as an intelligence.

The structure of ability emotional intelligence

Bipolarity

In his Personal construct theory, Kelly (1955) reasoned that all human thinking is bipolar in nature. In particular, he suggested that people make sense of their experiences and the world they live in by developing constructs that reflect internal ideas of reality. People engage in an anticipatory construing process of discriminating between objects, things and people that constitute our world. The simultaneous awareness of similarity and difference is considered essential in understanding these discriminations, thus, constructs are seen as bipolar. For example, if we want to decide whether a person is introvert or extravert we compare this person with others on a bipolar introversion to extraversion continuum according to his/her degree of introversion or extraversion.

We may broaden this reasoning to the field of ability emotional intelligence. We could argue that people interpret a facial expression as anger because they recognise features that represent the presence of anger and do not see features that point to the absence of anger. Or that people say that a particular action is effective in regulating their emotions, because they are aware of aspects that are not effective in regulating their emotions. So, as people classify response options to emotion-related questions according to degrees of

(in)correctness, we expect bipolar emotional intelligence factors (i.e., with incorrect items showing negative loadings and correct items showing positive loadings) to emerge for rating-based ability emotional intelligence tests. For the four branches of emotional intelligence, we expect that these bipolar factors will be: (1) *absent* to *present* emotions in faces for *perceiving*, (2) *incompatible* to *compatible* emotion labels and sensations for *facilitating*, (3) *incorrect* to *correct* emotion definitions, transitions, and changes for *understanding*, and (4) *ineffective* to *effective* actions to regulate emotions for *management*.

Rather than providing an in-depth analysis of the longstanding debate on traditional consensus scoring, or applying a scoring algorithm and matching people's response profiles to a traditional consensus scoring key, we focus on the fundamental idea behind the use of consensus scoring. Moreover, we test whether this idea holds for the structure of raw responses of rating-based ability emotional intelligence tests. Legree (1995) argued that responses of experts and non-experts are equivalent, except that non-experts are less consistent than experts. Responses of non-experts are here conceived as entailing common (expert) variance and unique (random) variance, implying that expertise can be closely approximated by large numbers of non-experts. For the field of ability emotional intelligence, the basic idea of consensus scoring is that correctness of emotional responses can be represented as an abstraction of what people use in everyday life, that is the agreement between people themselves and the rest of the group all interacting in the same emotional system (MacCann et al., 2004).

So, if this idea behind the use of consensus scoring is a valid way to approach correctness of responses to emotion-related questions, we believe that the loadings of the items on the expected bipolar emotional intelligence factors will mirror the mean item ratings. For each rating-based ability emotional intelligence test, this means that items that have a high mean score are thus considered correct in a consensus sample and will have positive loadings on the bipolar emotional intelligence factor. Similarly, items that have a low mean score are thus considered incorrect in a consensus sample and will have negative loadings on the bipolar emotional intelligence factor.

Acquiescence

We furthermore consulted the work of Russell and Carroll (1999) on the bipolarity of positive and negative affect to address possible confounds. Within the context of affect ratings, acquiescence - or the tendency to agree (or disagree) with particular response options on ordinal or Likert-type response scales regardless of the content of the items - has been studied systematically over many years. Moreover, this particular response bias has played a pivotal role in the debate concerning positive and negative affect as independent unipolar dimensions or as opposite poles of a bipolar dimension. It has been found robustly that acquiescence biases the resulting structure away from bipolarity towards two unipolar factors (e.g., Russell, 1979; Russell & Mehrabian, 1977).

We argue that acquiescence likewise may conceal the emergence of the expected bipolar emotional intelligence factors for rating-based ability emotional intelligence tests. As acquiescence consists of the tendency to rate all items more positively or negatively independent of the content of the items, it can be expected that acquiescence will emerge as a separate factor in the factor structure of rating-based ability emotional intelligence tests, with all items loading positively on it.

Multidimensionality

Multidimensionality is another concern that caused considerable confusion in testing the bipolarity of affect (Russell & Carroll, 1999). A first initiative to examine multidimensionality in the area of rating-based ability emotional intelligence assessment has already been made by Føllesdal and Hagtvet (2009). Using the generalizability theory, they showed that a large part of the variance in traditional consensus scores for *perceiving* as measured by the MCSEIT is due to the interaction between persons and stimuli. They argue that this may indicate that not one, but several factors may underlie the scores. Additional exploratory factor analysis on consensus scores of the rating-based Faces MCSEIT test provided indeed support for multidimensionality. Three emotion perception factors were found, that is, the absence of positive emotions in mostly sad faces, the absence of negative emotions in surprise and mostly sad faces, and the absence of negative emotions in happy faces. These factors reflect three sources of variance: (1) the distinction between happy and sad faces, (2) the distinction between positive and negative emotions, and (3) the distinction between present

and absent emotions. These results contrast the claim that consensus scores for *perceiving* are unidimensional (Salovey & Mayer, 1990; Mayer et al., 2002). From this point of view, we consider it essential to explore multidimensionality for all rating-based ability emotional intelligence tests.

To summarize, in light of the above described framework on how raw responses of rating-based ability emotional intelligence tests may be structured, we believe that two factors exist for each branch: one bipolar emotional intelligence factor (with items having either positive or negative loadings on it), mirroring the mean item ratings, and one unipolar acquiescence factor (with all items loading positively on it). Moreover, it is still possible that additional factors too may emerge and indicate multidimensionality. To test the structure for each branch, we will rotate the exploratory structure towards a hypothetical target structure through Procrustes rotation.

Implications for ability emotional intelligence as standard intelligence

The internal structures we expect to emerge empirically from the raw data of each branch may provide necessary, yet, not sufficient evidence to consider ability emotional intelligence as a type of intelligence. Therefore, we further examine (1) conceptual, (2) correlational, and (3) developmental criteria that have been used to see whether emotional intelligence meets the traditional intelligence standards.

Conceptual criterion

The conceptual criterion states that an intelligence should consist of a set of moderately correlated mental abilities reflecting actual mental performance rather than preferred ways of behaving, self-esteem of a person, or other non-cognitive achievements (Mayer et al., 2000). Mayer et al. (2002) theorized that emotional intelligence entails four related abilities (*perceiving*, *facilitating*, *understanding* and *managing*), with increasing complexity from the first to the fourth (*perceiving* and *facilitating* are more sensation-oriented and relate to the basic-level direct processing of emotional information, whereas *understanding* and *managing* are more reason-oriented and relate to higher-level conscious or deliberate processing of emotional information). In the current research, the Procrustes weighted emotional intelligence component scores and the Procrustes weighted

acquiescence component scores for all rating-based tests will be therefore represented in a higher-order model with a general emotional intelligence factor and a general acquiescence factor. In this confirmatory two-factor model, both first-order factors are expected to be zero-correlated. It is further investigated whether the second-order emotional intelligence branch factors are moderately correlated with one another, empirically form a coherent factor, and show a hierarchical pattern of loadings on a general emotional intelligence factor from the first to the fourth branch. We will also inspect the mean correlations of these second-order bipolar emotional intelligence branch factors with intelligence measures.

Correlational criterion

According to the correlational criterion, an intelligence should express convergent, discriminant and predictive relationships. Ability emotional intelligence has been asserted to entail both crystallized and fluid components (Côté, 2010) and to be more closely related to verbal than nonverbal intelligence (Brody, 2004; MacCann et al., 2004). Furthermore, Mayer and Salovey (1993) stressed the distinctiveness of ability emotional intelligence from personality, with exception of openness for which they predict low correlations in alignment with the observation that many intelligences show this particular relation ($r = .30$; Ackermann & Heggestad, 1997). Ability emotional intelligence should also be correlated with cognate measures of emotional intelligence and it has been seen as relevant to psychological well-being and interpersonal functioning (Mayer, Salovey, Caruso, & Sitarenios, 2001). In the present research, we will examine the relationships for the general emotional intelligence factor scores and the general acquiescence factor scores with intelligence (verbal, performance, and general intelligence, and abstract reasoning), personality (neuroticism, extraversion, openness, agreeableness, and conscientiousness), alexithymia (difficulties in identifying feelings, difficulties in describing feelings, externally-oriented thinking, an general alexithymia), and social- and emotional impairment (self-concept, anxiety, depression, anger, and disruptive behaviors). We believe a meaningful pattern of correlations for the general emotional intelligence factor scores will emerge, yet, not for the general acquiescence factor scores.

Developmental criterion

The developmental criterion states that, based on Binet and Simon' groundbreaking work, an intelligence should vary with age and experience (e.g., Brown, 1997; Carroll, 1993; Fancher, 1985). It has also been suggested that women are more emotionally intelligent than men (e.g., Lumley, Gustavson, Partridge, & Labouvie-Vief, 2005). In our research, we will examine whether the general emotional intelligence factor scores reveal progression with age and show gender differences in favor for girls. We will further explore whether age and gender differences may be observed for the general acquiescence factor scores.

STUDY 1**MATERIALS AND METHOD****Participants and procedure**

The sample consisted of 630 Dutch-speaking children and adolescents between the ages of 10 and 17 years from the fifth year of primary school up to the fourth year of secondary school (48.4% males; $M_{\text{age}} = 13.37$, $SD_{\text{age}} = 1.84$, 34.76% primary school children). This sample was divided in two random split-half samples. Both the first random split-half (48.9% males; $M_{\text{age}} = 13.35$, $SD_{\text{age}} = 1.85$; 37.14% primary school children) and the second random split-half (47.9% males; $M_{\text{age}} = 13.39$, $SD_{\text{age}} = 1.84$; 32.38% primary school children) consisted of 315 children. Recruitment was achieved by trained psychology students of Ghent University in the context of a course assignment. Parents and their eligible underage children were informed about the objectives and procedures of the research. Participation was confidential and voluntary. Based upon written consent, several paper-and-pencil measures were administered individually at home.

Measures***Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV; Mayer et al., 2015)***

The MSCEIT-YV is a 101-item maximum performance test (of which 97 items are scored) that can be administered from age 10 years and onward. The ability of perceiving emotions (32 items) is measured by eight photographed faces that

vary in expression (type, strength, and valence of the expressed emotion), gender (an equal amount of boys and girls), age (aged 10 to 18 years), and ethnicity (white and coloured). For each face, respondents are asked to evaluate on a 5-point Likert scale (1 = *none at all* and 5 = *a very strong feeling*) to which extent four emotions are apparent within the face. The targeted emotions (e.g., happiness, surprise, fear, anger, disgust, and sadness) differ slightly from face to face. The ability of facilitating thoughts (24 items) is assessed through synesthesia items in which emotion labels (e.g., happiness, anger, worry) and physical sensations related to temperature, speed, and color (e.g., cold, slow, red) are compared. Respondents are asked to rate to which extent an emotion feels like four different sensations or to which extent a combination of sensations feels like four different emotions. Answers are rated on a 5-point Likert scale (1 = *does not feel this way* and 5 = *definitely feels this way*). The ability of understanding emotions (23 items) is measured by multiple choice items on emotion definitions (i.e., coupling the correct emotion terms with descriptions of feelings), emotion transitions and changes (i.e., identifying emotions that arise from particular event descriptions), and emotion blends (i.e., choosing combinations of emotions that correspond to descriptions of particular emotional states). Respondents are asked to select the best suited answer out of four or five options. The ability of managing emotions (18 items) is measured via six stories. For each story, respondents are asked to evaluate on a 5-point Likert scale (1 = *not at all helpful* and 5 = *very helpful*) to which extent three prescribed actions are effective in making a person feel a certain way. The Dutch version of the MSCEIT-YV was translated from the English version by the first author, in collaboration with a departmental colleague. The final version was decided upon by a committee of bilingual experts on emotions (see Table 1 for the original MSCEIT-YV measurement design).

Table 1

The Original Measurement Design of the MSCEIT-YV for Study 1 and Adaptations and Additions for Study 2

Study	Items	Content	Perceiving	Facilitating	Understanding	Managing
1	Original	Task	8 faces	6 assignments	23 questions	6 stories
		Stimuli	4 items per face	4 items per assignment	1 score per question	3 items per story
		Format	Rating	Rating	Multiple choice	Rating
2	Original	Task	8 faces	6 assignments		6 stories
		Stimuli	4 items per face	4 items per assignment		3 items per story
		Format	Rating	Rating		Rating
	Adaptation/ Addition	Task	7 faces	6 assignments	110 questions	4 stories
		Stimuli	4 items per face	4 items per assignment	4 or 5 items per question	4 items per story
		Format	Rating	Rating	Rating	Rating

Wechsler Intelligence Scale for Children - Third Edition - NL (WISC-III-NL; Kort et al., 2005) and Raven's Standard Progressive Matrices (SPM; Raven, 1960)

The WISC-III and the SPM are developed to assess intelligence from age 6 onwards. The WISC-III measures verbal and non-verbal ability via 13 subtests. Three intelligence scores are calculated, i.e., verbal IQ, performance IQ, and total IQ. The SPM measures abstract reasoning via 60 multiple choice items arranged in five different sets with increasing difficulty ($\alpha = .85$).

Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999)

The HiPIC is a 144-item self-report questionnaire, measuring the Big Five personality factors of neuroticism, extraversion, agreeableness, openness, and conscientiousness in children from age 8 onwards. Items are rated on a 5-point Likert scale (1 = *uncharacteristic* and 5 = *very characteristic*). Cronbach's α s were respectively .33² for neuroticism, .68 for extraversion, .64 for agreeableness, .83 for openness, and .85 for conscientiousness.

Alexithymia Questionnaire for Children (AQ-C; Rieffe, Oosterveld, & Terwogt, 2006)

The AQ-C is a 20-item self-report alexithymia questionnaire, suited for administration from age 9 onwards. Items are rated on a 4-point Likert scale (1 = *not true* and 3 = *true*), and measure difficulties in identifying feelings ($\alpha = .74$), difficulties in describing feelings ($\alpha = .69$), externally-oriented thinking ($\alpha = .41$)³, and overall alexithymia ($\alpha = .71$).

Beck Youth Inventories (BYI; Dillen, Fontaine, & Verhofstadt-Deneve, 2009)

² Neuroticism α is low in comparison to the fair to good α s of the other scales in the present research, however, consistent with the neuroticism α reported in Veirman et al (2009).

³ The low Cronbach's α of externally-oriented thinking is consistent with those reported in literature (Rieffe et al., 2006), yet, signify that a careful interpretation of correlations with this scale is needed.

The BYI assess social and emotional impairment via five 20-item self-report inventories that can be administered from age 7 onwards. Items are rated on a 4-point Likert scale (0 = *never* and 3 = *always*) and measure self-concept ($\alpha = .83$), depression ($\alpha = .89$), anxiety ($\alpha = .86$), anger ($\alpha = .88$), and disruptive behaviors ($\alpha = .82$).

Data-analyses

First, the structure of raw responses is examined for the original items of the rating-based *perceiving*, *facilitating*, and *managing* MSCEIT-YV tests.

In a first random split-half, the factor structure of raw responses for all rating-based emotional intelligence tests is explored for each test separately by use of principal components analysis (PCA), no rotation is applied. The number of factors to retain is determined by inspection of the scree-plot, and the correlation between the loadings of the principal components and the mean item ratings. After, an orthogonal Procrustes rotation⁴ is performed. In this rotation, the initial retained component structure is rotated orthogonally as close as possible to our hypothetical target structure (Mulaik, 1972; Van de Vijver & Leung, 1997). The target structure contains a hypothetical emotional intelligence factor (based on the mean item ratings), an acquiescence factor (corresponding to a fixed loading of .30, as an approximate estimation of the mean correlation between the summed ratings and the individual item ratings), and if necessary one or more additional factors. The degree to which both structures converge is determined by

⁴ Affect research has shown that in case bipolarity is apparent in a single set of data, a Varimax rotation would tend to give two uncorrelated factors, depending on the strength of the acquiescence factor (Russell & Carroll, 1999). While Varimax rotation is in these cases used to simplify the interpretation of the principal components, it is often not the case because it doesn't enable to clearly distinguish bipolarity from acquiescence. In orthogonal Procrustes rotation, the situation is different because there are two sets of data and the purpose is to compare these sets and find the rotation that will best approximate one from the other. Moreover, the analysis translates, rotates, and scales (stretches/shrinks) one set to another, minimizing the residual sum of squares between the sets, under the constraint of preserving orthogonality. This technique may be used for any two sets of data, and is especially a powerful tool for hypothesis-guided rotation as is here the case (for an example in personality research, see McCrea, Zonderman, Costa, Bond, & Paunonen, 1996).

inspection of the congruence coefficients: (1) the Tucker's phi coefficients of agreement, also referred to as the coefficients of proportionality, and (2) the correlation coefficients⁵. Values smaller than .85 indicate non-negligible incongruences, values in the range .85 to .94 signify fair factorial comparability, and higher values indicate factorial similarity (Lorenzo-Seva & ten Berge, 2006). The stability of the structure in this first random split-half is then checked in the second random split-half via similar Procrustes rotations. In case stability is met, Procrustes rotations are performed on the complete sample and the results of these final Procrustes rotations form the base for further analyses.

Second, it is investigated how these results may be informative to decide on the status of emotional intelligence as an intelligence. Structural analyses are performed via confirmatory factor analysis (CFA) using *Mplus* 6.11 (Muthén & Muthén, 1998-2011) on the Procrustes weighted emotional intelligence component scores and the Procrustes weighted acquiescence component scores for *perceiving*, *facilitating*, and *managing*, and the Multi Health Systems (MHS) test publisher's scores for *understanding*.

Data are first screened on skewness and kurtosis. They are considered as non-normal if absolute values for skewness are greater than 1 and/or absolute values for kurtosis exceed 2 (Harlow, 2014). Model fit is evaluated by Schweizer's (2010) criteria for χ^2/df (acceptable in case < 3 and good in case < 2), comparative fit index (CFI; acceptable above .90 and good above .95), root mean square of approximation (RMSEA; acceptable below .08 and good below .05), and standardized root mean square residual (SRMR; expected to stay below .10). Further, CFA estimated factor scores for a general emotional intelligence factor and a general acquiescence factor are used to determine Pearson correlations with the network of convergent and discriminant relationships (i.e., intelligence, personality, alexithymia, and social and emotional

⁵The Tucker's phi coefficients are inspected for the Procrustes rotated bipolar emotional intelligence branch factors and the Procrustes rotated unipolar acquiescence branch factors. Inspection of the correlation coefficients is only possible for the Procrustes rotated bipolar emotional intelligence branch factors with the hypothetical emotional intelligence branch factors, and not for the Procrustes rotated unipolar acquiescence branch factors because the hypothetical unipolar acquiescence branch factors are set at a constant loading of .30.

impairment). These correlations are interpreted according to Cohen's (1988) standards (i.e., $.10 \leq r < .30$: small correlations, $.30 \leq r < .50$: moderate correlations, $r \geq .50$: large correlations). Finally, ANOVAs are performed to examine gender differences. Because verbal and written language performance is typically better in girls than in boys, and these tests have a high verbal load, we will control for verbal intelligence (Burman, Bitan, & Booth, 2008). Bivariate correlations are calculated to investigate age differences.

RESULTS

Internal structure at branch level

Perceiving

The scree plot for *perceiving* showed no clear inflexion point for the first random split-half sample. The first ten Eigenvalues were 3.70, 3.10, 2.28, 1.95, 1.74, 1.56, 1.44, 1.38, 1.13 en 1.08. Of the first nine unrotated components, the loadings of the second, third and fourth unrotated component were correlated with the *perceiving* mean item ratings (respectively $r = -.39$, $p < .05$; $r = .50$, $p < .01$; and $r = .47$, $p < .01$). Thus, four components (34.44% variance accounted for)⁶ were considered relevant for further analyses. For all other unrotated components the correlation with the *perceiving* mean item ratings was not significant ($r \leq |.27|$, $p = ns$). After Procustes rotation, an interpretable structure emerged with a first bipolar emotional intelligence *perceiving* factor (*absent* to *present* emotions in faces) and a second unipolar acquiescence factor⁷. The third and fourth factor were related to a tendency to interpret specific types of faces as representing happiness and surprise versus anxiety and disgust. In particular, the third factor expressed differences for two faces that express lifted eyebrows, eyes widely opened and an open mouth. Finally, the fourth factor was predominantly focused on two faces that express a closed or open smiling mouth, eyes not completely opened and frownd eyebrows. The results were found stable as the same interpretable structure occurred in the second random split-half sample.

⁶ The third hypothetical factor of target loadings and the fourth hypothetical factor of target loadings are based upon the post hoc interpretation of the third and fourth principal component and are related to specific faces.

⁷ We note that two *perceiving* items showed a negative, near zero Procrustes rotated factor loading on the acquiescence factor.

Tucker's phi's for the bipolar emotional intelligence *perceiving* factor and the unipolar acquiescence factor and the correlation coefficient of the bipolar emotional intelligence *perceiving* factor with the hypothetical emotional intelligence *perceiving* factor can be found in Table 2 for both random split-half samples.

Table 2

Proportion of Variance Accounted for (VAR) and Tucker's Phi's (ϕ) for the Procrustes Rotated Bipolar Emotional Intelligence Branch Factors (EI) and the Procrustes Rotated Unipolar Acquiescence Branch Factors (ACQ), and Correlation Coefficients (r) for the Procrustes Rotated Bipolar Emotional Intelligence Branch Factors (EI)

Branch	Study	Items	Factor	Split1			Split2			Complete		
				VAR	ϕ	r	VAR	ϕ	r	VAR	ϕ	r
Perceiving	1	O	EI	8.16	.87	.82	7.93	.89	.85	7.87	.89	.86
			ACQ	10.27	.84	-	11.32	.82	-	10.50	.84	-
	2	A	EI	7.09	.87	.87	7.95	.93	.94	7.25	.94	.94
			ACQ	17.15	.93	-	16.39	.96	-	16.60	.95	-
		OA	EI	5.74	.85	.84	6.50	.88	.88	5.83	.89	.89
			ACQ	12.27	.91	-	11.77	.94	-	11.93	.93	-
Facilitating	1	O	EI	11.74	.90	.91	12.87	.92	.95	12.13	.92	.95
			ACQ	13.13	.96	-	15.00	.95	-	13.88	.96	-
	2	A	EI	12.07	.97	.98	13.66	.97	.98	12.73	.98	.99
			ACQ	18.30	.96	-	20.40	.98	-	19.28	.98	-
		OA	EI	9.50	.94	.96	11.72	.95	.97	10.55	.96	.97
			ACQ	12.89	.95	-	14.53	.97	-	13.64	.97	-
Understanding	2	A	EI	8.62	.93	.92	6.96	.90	.89	7.60	.93	.92
			ACQ	12.50	.95	-	14.93	.96	-	13.66	.96	-
Managing	1	O	EI	18.41	.98	.98	19.16	.96	.97	18.68	.98	.98
			ACQ	14.79	.98	-	13.57	.96	-	14.01	.98	-
	2	A	EI	13.13	.97	.97	12.13	.95	.95	12.43	.96	.97
			ACQ	14.99	.96	-	17.05	.97	-	15.96	.97	-
		OA	EI	13.73	.97	.97	13.63	.96	.96	13.47	.97	.97
			ACQ	11.31	.96	-	13.02	.98	-	12.11	.97	-

Note. $N_{\text{Study1-Complete}} = 630$, $N_{\text{Study1-Split1}} = 315$, $N_{\text{Study1-Split2}} = 315$, $N_{\text{Study1}} = 664$, $N_{\text{Study1-Split1}} = 332$, $N_{\text{Study1-Split2}} = 332$. O = original items for *perceiving*, *facilitating*, and *managing*; A = additional items for *perceiving*, *facilitating*, and *managing* and the adapted rating version of the *understanding* items; OA = original and additional/adapted items combined.

Facilitating

The scree plot for *facilitating* showed a clear inflection point at three factors for the first random split-half sample which indicates two (major) components (24.88% of variance accounted for) for further analyses. The first ten Eigenvalues were 3.48, 2.49, 1.62, 1.41, 1.28, 1.17, 1.07, 1.05, 1.00 and .87. Of the first nine unrotated components, the loadings of the first and the second unrotated component were correlated with the *facilitating* mean item ratings ($r = .93$, $p < .001$ and $r = -.85$, $p < .001$), while the other unrotated components showed no significant correlation with the *facilitating* mean item ratings ($r \leq .22$, $p = ns$). After Procustes rotation, a first bipolar emotional intelligence *facilitating* factor (*inconsistent* to *consistent* emotion labels and sensations) and a second unipolar acquiescence factor were found. The same interpretable structure occurred in the second random split-half sample, showing the robustness of the found structure (see Table 2).

Managing

The scree plot for *managing* showed a clear inflection point at three factors for the first random split-half sample which suggests to retain two (major) components (33.21% of variance accounted for) for further analyses. The first ten Eigenvalues were 3.32, 2.66, 1.46, 1.35, .98, .91, .89, .80, .72, and .69. Of the first nine unrotated components, only the loadings of the first unrotated component were correlated with the *managing* mean item ratings ($r = .98$, $p < .001$). All other unrotated components had no significant correlation with the *managing* mean item ratings ($r \leq .08$, $p = ns$). After Procustes rotation, a first bipolar emotional intelligence *managing* factor (*ineffective* to *effective* actions to regulate emotions) and a second unipolar acquiescence factor emerged. These findings were found robust as this interpretable structure was replicated in the second random split-half sample (see Table 2).

As the structure for *perceiving*, *facilitating*, and *managing* was found to be stable over both split-half samples, the PCAs with Procrustes rotation were ran for each of these branches within the complete sample. As expected, the structure found for each branch in both split-half samples was also found for the complete sample (see Table 2). The item loadings after Procrustes rotation for *perceiving*, *facilitating* and *managing* are plotted against the mean item ratings for

respectively *perceiving*, *facilitating* and *managing* in Figure 1. It was decided to run further analyses on the complete sample⁸.

⁸ The third and the fourth Procrustes rotated *perceiving* factor were not included in further analyses because they were related to specific faces.

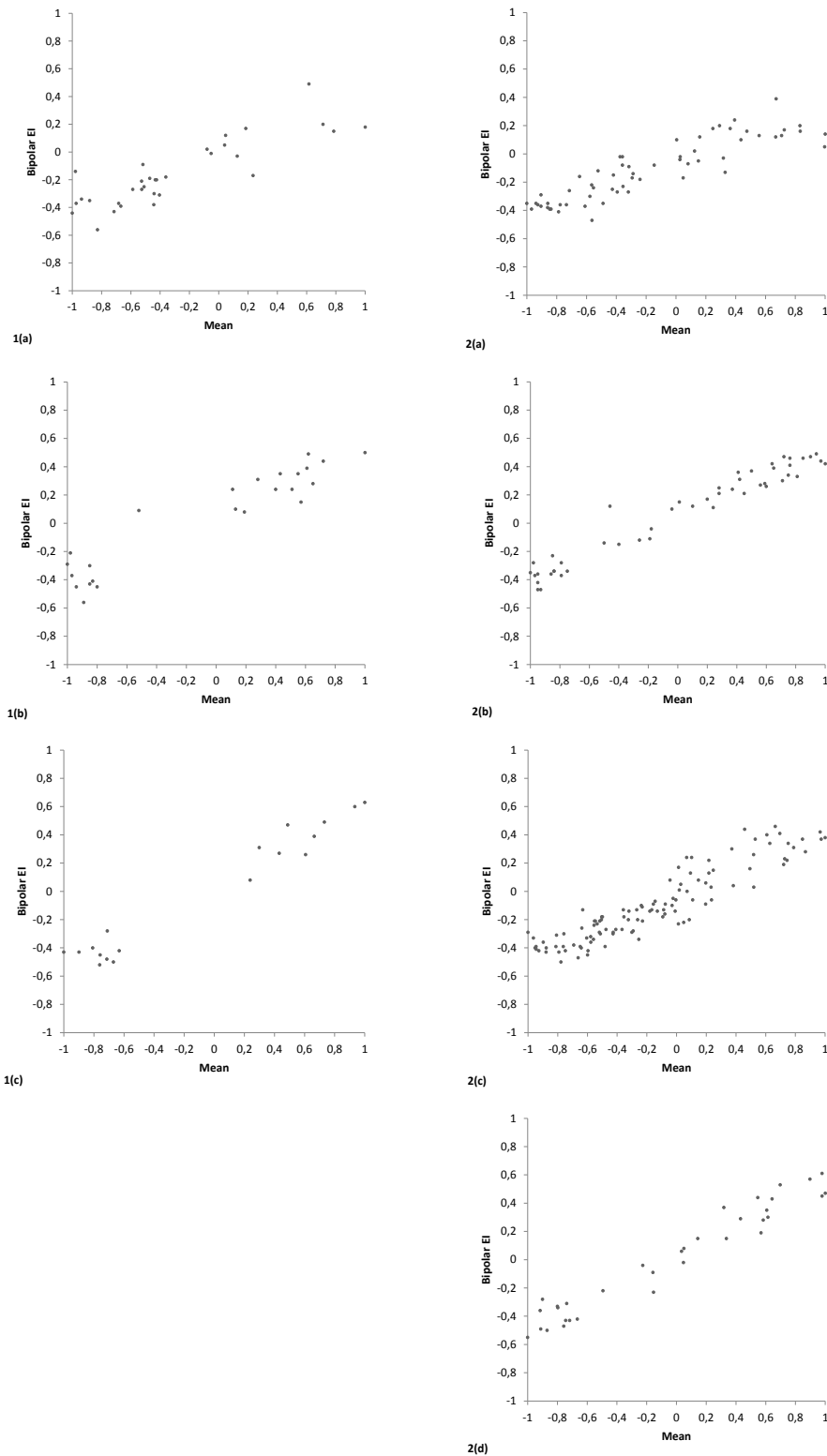


Figure 1. The item loadings after Procrustes rotation on the bipolar emotional intelligence factor are plotted against the mean item ratings in the first study for 1(a) *perceiving*, 1(b) *facilitating*, and 1(c) *managing*, and in the second study for 2(a) *perceiving*, 2(b) *facilitating*, 2(c) *understanding*, and 2(d) *managing*.

Internal structure across branches

To investigate the internal structure across branches, we performed a CFA. Since the values for skewness levels (-1.24, .44) and kurtosis levels (-.23, 2.80) of the Procrustes weighted component scores were not in the acceptable range, a CFA with Mean- and-Variance-Adjusted Maximum Likelihood was conducted. The tested two-factor model consisted of a general emotional intelligence factor and a general acquiescence factor (see Figure 2 for factor loadings and proportions of variance explained). The general emotional intelligence factor contained four indicators, i.e. the Procrustes weighted component scores for the first factor of *perceiving*, *facilitating*, and *managing* and the MHS scores for *understanding* (see Table 3 for intercorrelations). The general acquiescence factor contained three indicators, i.e. the Procrustes weighted component scores for the second unipolar acquiescence factor of *perceiving*, *facilitating*, and *managing*. A mutual zero-order correlation ($r = -.04$) was found between both higher-order factors. The model produced acceptable to good fit values, $\chi^2(13) = 37.38$, $p < .001$, $\chi^2/df = 2.88$, CFI = .93, RMSEA = .06, SRMR = .05. Furthermore, correlations tend to be higher among the Procrustes weighted emotional intelligence component scores for *perceiving*, *facilitating*, and *managing* and the MHS scores for *understanding* (mean $r = .29$) than between these scores and cognitive markers (mean $r = .21$).

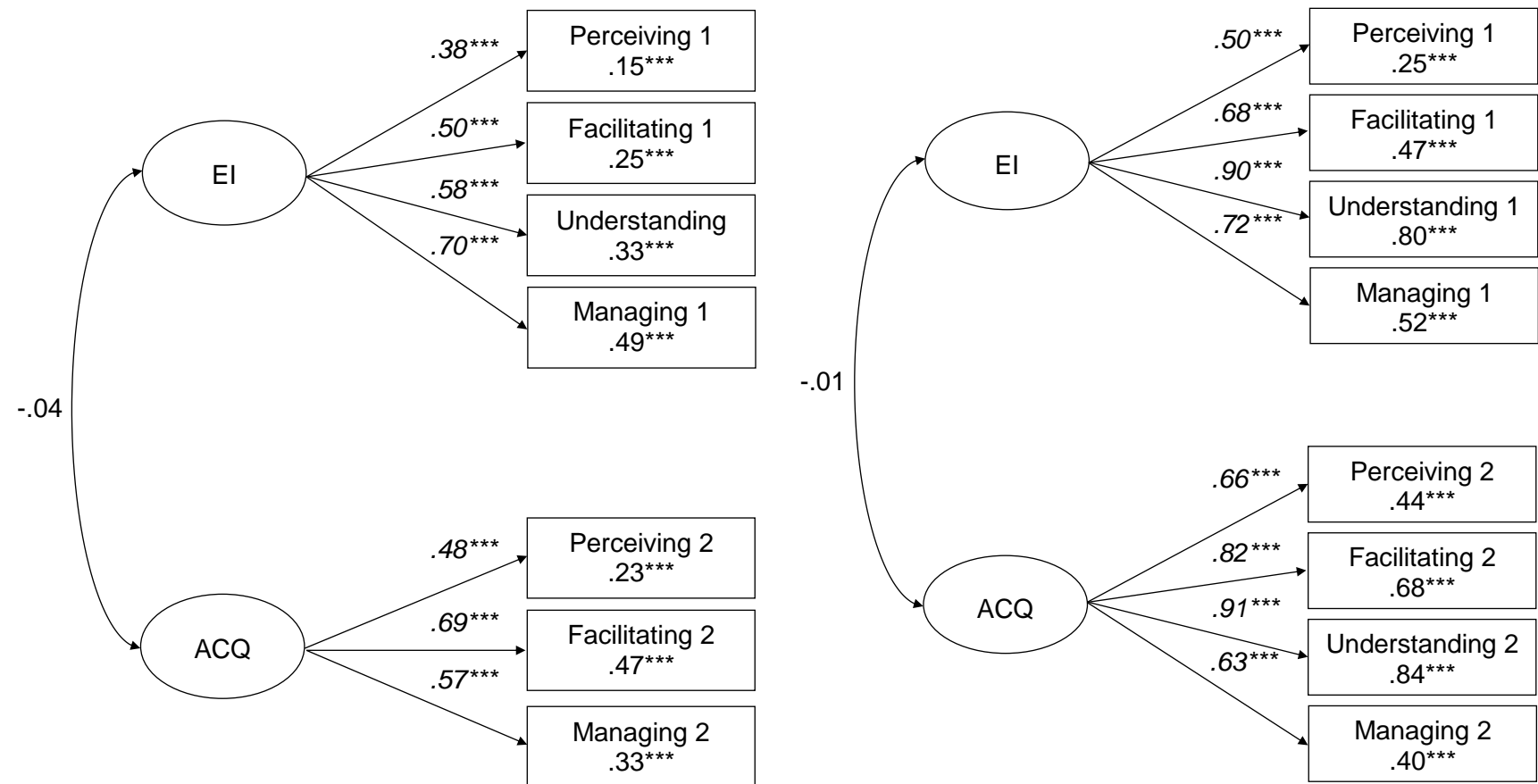


Figure 2. CFA results for Study 1 (panel on the left side) and Study 2 (panel on the right side) for the four-branch model using Procrustes weighted component scores.

*** $p < .001$.

Table 3

Correlations among Procrustes Weighted Component Scores for Perceiving, Facilitating, and Managing and the MHS Scores for Understanding

	1.	2.	3.
1. Managing	-		
2. Understanding	.41***	-	
3. Facilitating	.36***	.26***	-
4. Perceiving	.24***	.20***	.24***

*** $p < .01$.

Network of convergent and discriminant relationships

The general emotional intelligence factor scores showed small (i.e., performance intelligence) to moderate (i.e., verbal intelligence, total intelligence, and abstract reasoning) positive correlations with measures of intelligence. Next, small correlations were observed between the general emotional intelligence factor scores and personality (positively correlated: extraversion, openness, and agreeableness; negatively correlated: neuroticism). Also a small positive correlation was found between the general emotional intelligence factor scores and self-esteem (i.e., self-concept). Furthermore, small negative correlations were found between the general emotional intelligence factor scores and alexithymia (i.e., communication, externally-oriented thinking, and overall alexithymia) and pathology (i.e., anger and disruptive behaviors). The general acquiescence factor scores in contrast showed no significant correlations with intelligence and alexithymia. Yet, small positive correlations were found with personality (i.e., neuroticism, extraversion, and openness), self-esteem (i.e., self-concept) and pathology (i.e., anxiety, depression, anger, and disruptive behaviors). Pearson product moment correlations are presented in Table 4.

Table 4

Pearson Correlations (r) of External Criteria and the Estimated Higher-order Factor Scores for the General Emotional Intelligence Factor and the General Acquiescence Factor from Study 1 (EI1, ACQ1) and Study 2 (EI2, ACQ2)

Measure	r_{EI1}	r_{ACQ1}	r_{EI2}	r_{ACQ2}
Intelligence				
WISC-III – Verbal IQ	.35***	.02	.28***	.02
WISC-III – Performance IQ	.23***	.02	.16***	-.01
WISC-III – Total IQ	.33***	.02	.27***	.01
SPM – Abstract reasoning	.43***	-.03	.38***	-.07
Personality				
HiPIC – Neuroticism	-.09*	.13**	-.03	.15***
HiPIC – Extraversion	.15***	.19***	.21***	.22***
HiPIC – Openness	.24***	.19***	.27***	.25***
HiPIC – Agreeableness	.24***	-.06	.20***	-.04
HiPIC – Conscientiousness	.07	.04	.06	.01
Alexithymia				
AS-C – Identification	-.06	.07	-.07	.11**
AS-C – Communication	-.13**	.01	-.08*	.00
AS-C – Externally-oriented thinking	-.24***	-.05	-.22***	-.06
AS-C – Total	-.20***	.02	-.17***	.03
Social and Emotional Impairment				
BYI – Self concept	.11**	.09*	.11**	.09*
BYI – Depression	-.08	.09*	-.15***	.06
BYI – Anxiety	-.07	.17***	-.08	.13**
BYI – Anger	-.11**	.16***	-.17***	.11**
BYI – Disruptive behaviors	-.08*	.11**	-.08*	.06

Note. $N_{\text{Study1}} = 630$, $N_{\text{Study2}} = 664$ for all scales, with the exception of $N_{\text{Study2}} = 659$ for the WISC-III; WISC-III: Wechsler Intelligence Scale for Children Third Edition; SPM: Standard Progressive Matrices; HiPIC: Hierarchical Personality Inventory for Children; AS-C: Alexithymia Scale for Children; BYI: Beck Youth Inventories.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Age and gender differences

To investigate gender differences in the general emotional intelligence factor scores and the general acquiescence factor scores two ANCOVAs were executed, controlled for verbal intelligence. A significant gender difference was found for the general emotional intelligence factor scores, $F(1, 627) = 24.78$, $p < .001$ (partial $\eta^2 = .04$), indicating that girls in general outperformed boys. No gender difference was found for the general acquiescence factor scores, $F(1, 627) = .54$, $p = .46$ (partial $\eta^2 = .00$). Furthermore, a significant positive correlation was found between participants' age and the general emotional intelligence factor scores ($r = .18$, $p < .001$), showing that older participants in general achieve higher scores. No relationship was observed between age and the general acquiescence factor scores ($r = .04$, $p = .30$).

STUDY 2

MATERIALS AND METHOD

Participants and procedure

The sample consisted of 664 Dutch speaking children and adolescents between the ages of 8 and 16 years from the third year of primary school up to the fifth year of secondary school (39.8% males; $M_{\text{age}} = 13.42$, $SD_{\text{age}} = 1.85$, 34.79% primary school children). This sample was also randomly split in two subsamples. Both the first random split-half (39.2% males; $M_{\text{age}} = 13.45$, $SD_{\text{age}} = 1.85$; 33.73% primary school children) and the second random split-half (40.4% males; $M_{\text{age}} = 13.39$, $SD_{\text{age}} = 1.86$; 35.84% primary school children) consisted of 332 children. The procedure for Study 2 was similar to the procedure of Study 1.

Measures

As in Study 1, participants completed the WISC-III-NL, SPM, AQ-C, HiPIC and the BYI⁹. Furthermore, to examine the stability and the generalizability of the

⁹ Alpha's were similar to those observed in study 1 for the SPM ($\alpha = .85$), the HiPIC (neuroticism $\alpha = .30$, extraversion $\alpha = .68$, agreeableness $\alpha = .65$, openness $\alpha = .82$, and conscientiousness $\alpha = .86$), the AS-C (difficulties in identifying feelings $\alpha = .75$, difficulties in describing feelings $\alpha = .72$, externally-oriented thinking $\alpha = .34$, and overall alexithymia $\alpha = .72$), and the BYI (self-concept $\alpha = .83$, depression $\alpha = .90$, anxiety $\alpha = .88$, anger $\alpha = .89$, and disruptive behaviors $\alpha = .82$).

results that were found in Study 1, participants filled out (1) the MSCEIT-YV, that included the original tests for *perceiving*, *facilitating*, and *managing* and an adapted rating-based version of the original multiple choice *understanding* test, and (2) also three additional sets of items for *perceiving*, *facilitating*, and *managing* (see Table 1).

Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV; Mayer et al., 2015)

The original scales of *perceiving*, *facilitating* and *managing* are administered as was the case for Study 1. Instead of the multiple choice *understanding* test, respondents are asked to fill out a 110-item rating version of this test. On a 5-point Likert scale (1 = *not at all* and 5 = *very strong*), they are asked to which extent emotion terms are compatible with descriptions of feelings (i.e., emotion definitions), emotions are related to particular event descriptions (i.e., emotion transitions and changes), and a combination of emotions corresponds to descriptions of particular emotional states (i.e., emotion blends).

Perceiving additional items

The ability of perceiving emotions (28 items) is additionally measured by seven photographed faces (with frontal gaze direction and frontal view images) that were selected from the Radboud faces database (Langner et al., 2010). These faces (from four Caucasian white males, one Caucasian white boy, two Caucasian white females, and one Moroccan male) represent surprise, contempt, anger, happiness, anxiety, disgust, and sadness. The targeted emotions (e.g., surprise, contempt, anger, happiness, anxiety, disgust, and sadness) differ from face to face. For each face, respondents are asked to rate four emotion terms: one term corresponds to the emotion that the face expresses; one term represents an emotion that is clearly not expressed by the face; the two other terms represent emotions that in the initial validation study of Langner et al. (2010) were found to be confounded with the emotion that the face expresses¹⁰.

¹⁰ An exception is made for the happiness face. The results of the study of Langner et al. (2010) showed that only one emotion was confused with happiness within this face, so for the current research two emotions that pointed to absent emotions in this face were selected.

Respondents are asked to evaluate on a 5-point Likert scale (1 = *none at all* and 5 = *a very strong feeling*) to which extent four emotions are expressed in the face.

Facilitating additional items

The ability of facilitating thoughts (24 items) is assessed through additional items in which six emotion words are compared with targeted emotion words: joyful (with irritated, full of trust, proud, and jealous), sad (with dejected, fearful, full of hate, and unhappy), angry (with full of compassion, hopeless, hurt, and frustrated), afraid (with desperate, homesick, anxious, and astonished), in love (with enthusiastic, longing, envious, and disillusioned), and ashamed (with shy, impatient, bored, and afraid). These items are based on a study of Veirman and Fontaine (in press) on the dimensional structure of the emotion domain. In their free listing study, joyful, angry, sad and afraid emerged as the four most frequently reported emotion terms, whereas in love is the most frequently mentioned positive interpersonal emotion term, and ashamed is the most frequently mentioned negative interpersonal emotion term. In their similarity rating study, 85 emotion terms were, based on multidimensional scaling techniques, represented in a four-dimensional space of valence, power, arousal and novelty. The distances among these 85 emotion terms in this four-dimensional space were used to select the targeted emotion words. For each of the six emotion words, two closely in distance related emotion words and two emotion words that were not closely in distance related were selected. Respondents are asked to rate to which extent an emotion feels like four other emotions. Answers are rated on a 5-point Likert scale (1 = *does not feel this way* and 5 = *definitely feels this way*).

Managing additional items

The ability of managing emotions (16 items) is measured via four additional stories. These stories (i.e., friend blames you for his bad grade, chess club members complain on you as secretary, friends make less effort than expected upon your move, unfair teacher warning for entering a restricted area while not aware of) were selected from the initial 16 stories of the research version of the youth Situational Test for Emotion Management (MacCann, Wang, Matthews, & Roberts, 2010) on the applicability of their content to children and adolescents.

For each story, respondents are asked to evaluate on a 5-point Likert scale (1 = *not at all helpful* and 5 = *very helpful*) to which extent four prescribed actions are effective in making a person feel a certain way.

Data-analyses

The structure of raw responses is examined and interpreted the same way as in Study 1. First, the internal structure for the additional sets of items for *perceiving*, *facilitating*, and *managing* and the rating version of the items for the *understanding* MSCEIT-YV test is investigated. Second, the internal structure is investigated for *perceiving*, *facilitating*, and *managing*, jointly on the original and the additional items of the MSCEIT-YV subtests.

Moreover, it is also investigated the same way as in Study 1 how these results may be informative to decide on the status of emotional intelligence as an intelligence. Structural analyses in Study 2 are performed on the Procrustes weighted emotional intelligence component scores and the Procrustes weighted acquiescence component scores for *perceiving*, *facilitating*, *understanding* and *managing*.

RESULTS

Internal structure at branch level

Perceiving

First, the internal structure was investigated for the additional items of *perceiving*. The scree plot expressed a clear inflexion point at two factors for the first random split-half sample, which suggests one (major) component. The first ten Eigenvalues were 4.86, 1.99, 1.88, 1.69, 1.42, 1.40, 1.30, 1.11, 1.04 and .97. Of the first nine unrotated components, the loadings of the second, and third unrotated component were correlated with the mean item ratings ($r = -.65$, $p < .001$, and $r = .57$, $p < .01$, respectively), thus, three components were retained for further analyses (31.17% of variance accounted for)¹¹. For all other unrotated components the correlation with the mean item ratings was not significant ($r \leq |.34|$, $p = ns$). After Procrustes rotation, an interpretable structure emerged, with a

¹¹ The third component of the additional items for *perceiving* gave no clear indication for specific hypotheses, thus, a factor with random target loadings was used in the Procrustes rotation.

first bipolar emotional intelligence *perceiving* factor (*absent* to *present* emotions in faces) and a second unipolar acquiescence factor¹². The third factor was not clearly interpretable. The results were found robust as the same structure occurred in the second random split-half sample. Tucker's phi's for the bipolar emotional intelligence *perceiving* factor and the unipolar acquiescence factor and the correlation coefficient of the bipolar emotional intelligence *perceiving* factor with the hypothetical emotional intelligence *perceiving* factor are presented in Table 2 for both random split-half samples.

Second, the internal structure was investigated for the original and the additional items of *perceiving* jointly. The scree plot expressed no clear inflexion point in the first random split-half sample: a first inflexion point appeared at two factors, suggesting one (major) component, but a second inflexion point appeared at five factors, suggesting to retain four (major) components. The first ten Eigenvalues were 7.81, 3.24, 2.87, 2.69, 2.14, 1.92, 1.79, 1.72, 1.70, and 1.51. Of the first nine unrotated components, the loadings of the second, and third unrotated component were correlated with the mean item ratings ($r = .56$, $p < .001$, and $r = .61$, $p < .001$, respectively). For all other unrotated components the correlation with the mean item ratings was not significant ($r \leq |.12|$, $p = ns$), with exception for the 8th component ($r = .34$, $p < .01$). Similar to the results for *perceiving* in Study 1, four factors were retained for further analyses (27.67% of variance accounted for)¹³. After Procrustes rotation, a first bipolar emotional intelligence *perceiving* factor (*absent* to *present* emotions in faces) and a second unipolar acquiescence factor was found¹⁴. The third factor expressed differences related to the recognition of surprise in positive faces versus negative faces. The fourth factor is characterized by a general tendency to recognize positive versus negative emotions in non-prototypical faces. These findings were found to be

¹² One item of the additional items for *perceiving* showed a negative, near zero Procrustes rotated factor loading on the unipolar acquiescence factor.

¹³ The third hypothetical factor of target loadings and the fourth hypothetical factor of target loadings are based upon the post hoc interpretation of the third and fourth principal component and are related to specific faces.

¹⁴ Two *perceiving* items showed a negative, near zero Procrustes rotated factor loading on the acquiescence factor.

stable as this interpretable structure was replicated in the second random split-half sample (see Table 2).

Facilitating

First, the internal structure was investigated for the additional items of *facilitating*. The scree plot of the first random split-half sample showed a clear inflection point at three factors which points to two (major) components (30.37% of variance accounted for). The first ten Eigenvalues were 4.63, 2.67, 1.39, 1.27, 1.17, 1.05, 1.03, .94, .87 and .85. Of the first nine unrotated components, the loadings of the first and the second unrotated component were both correlated with the mean item ratings ($r = .69$, $p < .001$ and $r = -.96$, $p < .001$). For all other unrotated components the correlation with the mean item ratings was not significant ($r \leq .15$, $p = ns$). After Procustes rotation, a first factor corresponded to a bipolar emotional intelligence *facilitating* factor (*inconsistent* to *consistent* emotions) and a second factor represented the unipolar acquiescence factor. Again, similar results were found for the second random split-half sample thus the structure was stable (see Table 2).

Second, the internal structure was examined for the original and the additional items of *facilitating* jointly. The scree plot of the first random split-half sample expressed a clear inflection point at three factors which points to two (major) components (22.39% of variance accounted for). The first ten Eigenvalues were 6.85, 3.90, 1.77, 1.69, 1.53, 1.51, 1.43, 1.43, 1.32, and 1.26. Of the first nine unrotated components, the loadings of the first and the second unrotated component were both correlated with the mean item ratings ($r = .88$, $p < .001$ and $r = -.92$, $p < .001$). All other unrotated components had no significant correlations with the mean item ratings ($r \leq .12$, $p = ns$). After Procustes rotation, a first bipolar emotional intelligence *facilitating* factor (*inconsistent* to *consistent* emotion labels and sensations) and a second unipolar acquiescence factor emerged. Again, the results were found robust as the second random split-half sample yielded the same interpretable structure (see Table 2).

Understanding

The internal structure was investigated for the adapted rating version of *understanding*. The scree plot of the first random split-half sample showed a clear

inflection point at three factors which points to two (major) components (21.12% of variance accounted for). The first ten Eigenvalues were 15.55, 7.69, 3.03, 2.83, 2.53, 2.22, 2.15, 2.05, 1.94, and 1.89. Of the first nine unrotated components, the loadings of the first and the second unrotated component were correlated with the mean item ratings ($r = -.59, p < .001$ and $r = .94, p < .001$). A smaller correlation was observed for the third component ($r = -.22, p < .05$), whereas the other unrotated components showed no significant correlations with the mean item ratings ($r \leq |.08|, p = ns$). After Procustes rotation, a first bipolar emotional intelligence *understanding* factor (*incorrect* to *correct* emotion definitions, transitions, and changes) and a second unipolar acquiescence factor were found. The same interpretable structure emerged for the second random split-half sample, signifying the robustness of the results (see Table 2).

Managing

First, the internal structure was investigated for the additional items of *managing*. The scree plot of the first random split-half sample indicated a clear inflection point at three factors which points to two (major) components (28.13% of variance accounted for). The first ten Eigenvalues were 2.49, 2.01, 1.49, 1.27, 1.04, 1.02, .92, .85, .79 and .74. Of the first nine unrotated components, the loadings of the first and second unrotated component were correlated with the mean item ratings ($r = .89, p < .001$ and $r = -.95, p < .001$). For all other unrotated components, the correlation with the mean item ratings was not significant ($r \leq |.17|, p = ns$). After Procustes rotation, a first bipolar emotional intelligence *managing* factor (*ineffective* to *effective* actions to regulate emotions) and a second unipolar acquiescence factor emerged. A similar interpretable structure occurred also in the second random split sample, showing the robustness of the results (see Table 2).

Second, the internal structure was examined for the original and the additional items for *managing* jointly. The scree plot of the first random split-half sample expressed a clear inflection point at three factors which points to two (major) components (25.02% of variance accounted for). The first ten Eigenvalues were 4.68, 3.83, 1.77, 1.57, 1.41, 1.26, 1.20, 1.14, 1.04, and 1.01. The loadings of the first unrotated component were correlated with the mean item ratings ($r = .97, p < .001$), while for all other unrotated components no significant

correlations with the mean scores of the items were observed ($r \leq .23$, $p = ns$). After Procrustes rotation, a first bipolar emotional intelligence *managing* factor (*ineffective* to *effective* actions to regulate emotions) and a second unipolar acquiescence factor occurred. These results were stable as the same interpretable structure was replicated for the second random split-half sample (see Table 2).

As the structure for *perceiving*, *facilitating*, *understanding* and *managing* was found to be stable over both split-half samples, the PCAs with Procrustes rotation were ran for each of these branches within the complete sample. As expected, the structure found for each branch in both split-half samples was also found for the complete sample (see Table 2). It was decided to run further analyses on the complete sample with the original and the additional items taken together for *perceiving*, *facilitating* and *managing* and the items of the rating version for *understanding*¹⁵. The item loadings after Procrustes rotation for *perceiving*, *facilitating*, *understanding* and *managing* are plotted against the mean item ratings of *perceiving*, *facilitating*, *understanding* and *managing* in Figure 1.

Internal structure across branches

To examine the internal structure across branches, we executed a CFA. Because the values for skewness levels (-1.32, .49) and kurtosis levels (.23, 4.21) for the Procrustes weighted component scores were not in the acceptable range a CFA with Mean- and Variance-Adjusted Maximum Likelihood was performed. The tested two-factor model contained a general emotional intelligence factor and a general acquiescence factor (see Figure 2 for factor loadings and proportions of variance explained). The general emotional intelligence factor and the general acquiescence factor each contained four indicators, that is, the Procrustes weighted component scores for *perceiving*, *facilitating*, *understanding* and *managing* (see Table 5 for intercorrelations). A mutual zero-order correlation ($r = -.01$) was observed between both higher-order factors. The model showed acceptable to good fit values, $\chi^2(19) = 93.77$, $p < .001$, $\chi^2/df = 4.94$, CFI = .93, RMSEA = .08, SRMR = .07. Furthermore, correlations tend to be higher among the Procrustes weighted emotional intelligence component scores for *perceiving*,

¹⁵ The third and the fourth Procrustes rotated *perceiving* factor were again not included in further analyses because they were related to specific faces.

facilitating, understanding, and managing (mean $r = .48$) than between these scores and cognitive markers (mean $r = .18$).

Table 5

Correlations among Procrustes Weighted Component Scores for Perceiving, Facilitating, Understanding and Managing

	1.	2.	3.
1. Managing	-		
2. Understanding	.65***	-	
3. Facilitating	.50***	.61***	-
4. Perceiving	.33***	.45***	.37***

*** $p < .001$.

Network of convergent and discriminant relationships

The general emotional intelligence factor scores showed small (i.e., verbal, performance, and total intelligence) to moderate (i.e., abstract reasoning) positive correlations with intelligence (see Table 4). Furthermore, small positive correlations were observed between the general emotional intelligence factor scores and personality (i.e., extraversion, openness, and agreeableness) and self-esteem (i.e., self-concept), while small negative correlations were observed between the general emotional intelligence factor scores and alexithymia (i.e., communication, externally-oriented thinking, and overall alexithymia) and pathology (i.e., depression, anger, and disruptive behaviors). The general acquiescence factor scores showed no significant correlations with intelligence. Small positive correlations were observed between the general acquiescence factor scores and personality (i.e., neuroticism, extraversion, and openness), alexithymia (i.e., identification), self-esteem (i.e., self-concept) and pathology (i.e., anxiety and anger).

Age and gender

Two ANCOVAs, controlled for verbal intelligence, were performed to investigate gender differences in the general emotional intelligence factor scores and the general acquiescence factor scores. A significant gender difference was observed for the general emotional intelligence factor scores, showing that girls generally outperformed boys, $F(1, 656) = 26.19$, $p < .001$ (partial $\eta^2 = .04$). There was no gender difference observed for the general acquiescence factor scores,

$F(1, 656) = .36, p = .55$ (partial $\eta^2 = .00$). Furthermore, a significant positive correlation was found between participants' age and the general emotional intelligence factor scores ($r = .28, p < .001$), showing that older participants in general obtain higher scores. No relationship was found between age and the general acquiescence factor scores ($r = .03, p = .45$).

DISCUSSION

Rating-based ability emotional intelligence tests have been used for over 20 years. Yet, until now studies have mainly been concerned with consensus scored responses. Despite the fact that the use of consensus scoring may have a profound impact on the validity and utility of this type of tests, it is not clear how consensus scores are linked to ability emotional intelligence. The present research is in this respect different because it developed a framework to understand how these tests operate and how variation in raw responses to emotion-related questions may be related to variation in ability emotional intelligence. The value of this framework was supported by empirical results of two studies.

The structure of ability emotional intelligence

For both studies the initial found PCA structures for each branch that were Procrustes rotated to the hypothetical structures showed high congruence coefficients. Indeed, as expected the Procrustes rotated factor structure could be consistently interpreted for each branch as containing a bipolar emotional intelligence factor, and a unipolar acquiescence factor. Only few of the Tucker's phi's and correlations were below .85 and for *perceiving* (5.6%), 34.4% were in the range of .85 to .94 signifying fair factorial similarity, and 60.0% were .95 or higher indicating equal factors. Further, multidimensionality was only for *perceiving*.

Bipolarity

The results of Study 1 and Study 2 thus show that bipolarity is a robust and recurrent phenomenon that generalizes across rating-based ability emotional intelligence tests. The Procrustes rotated bipolar emotional intelligence branch factors point to the importance of recognizing similarities and differences in the

emotion domain, reflecting the degree of (in)correctness of item responses. In this way, these factors mirror (1) the ability to identify *present* and *absent* emotions in faces, (2) the ability to identify *compatible* and *incompatible* emotion labels and sensations, (3) the ability to identify *correct* and *incorrect* emotion definitions, transitions, changes, and blends, and (4) the ability to identify *effective* and *ineffective* actions to regulate emotions. As most MSCEIT-YV items mainly focus on one pole of the bipolar emotional intelligence factor for each branch (i.e., absence, inconsistency, incorrectness, ineffectivity), it might be recommended to make improvements to the current version of the MSCEIT-YV by adding items that focus to the opposite pole (i.e., presence, consistency, correctness, effectivity). Moreover, the Procrustes weighted emotional intelligence component scores for each branch show individual differences in people's insight in the emotion domain. Because people that rate the correct responses higher and incorrect responses lower are those that are awarded higher scores, people may be ranked on these ability emotional intelligence tests, as is the case in traditional intelligence tests.

Furthermore, Study 1 and Study 2 provide support for the idea behind consensus scoring. In both studies, the mean item ratings are almost perfectly reflected in the loadings of the items on the bipolar emotional intelligence factor for the different branches, implying that the idea of consensus is reflected in the correlational pattern of the items.

Acquiescence

The results of both studies bring furthermore robust evidence to the fore that raw responses of rating-based ability emotional intelligence tests are affected by acquiescence. Moreover, it has been found that in the majority of the cases most of the variance is accounted for by the Procrustes rotated unipolar acquiescence branch factors and not by the Procrustes rotated bipolar emotional intelligence branch factors. It stands to reason that this especially warrants attention for further use of the traditional consensus scoring, because the assumed correctness of the responses in consensus scoring keys is also influenced by acquiescence, yet, not accounted for at all. This in particular may have resulted in spurious conclusions about the ability emotional intelligence construct. As acquiescence is only one response style among others (for a recent overview,

see Van Vaerenbergh & Thomas, 2013), future research is challenged to broaden the scope of the present research and investigate the influence of other response styles on rating-based ability emotional intelligence tests.

Multidimensionality

The results of both studies demonstrate that multidimensionality of the four-branch ability model was only partially supported by additional factors for *perceiving*. The observation that multidimensionality was not found for other branches is in line with the findings of Føllesdal and Hagtvet (2009). The detected additional factors for the *perceiving* branch relate to a small set of responses (items) for a few faces (item stems). Inspection of these faces indicates that (1) these faces are not prototypical for any emotion or (2) features for different emotions are mixed in these faces. In these cases, people's responses may go various directions. For example, in non-prototypical faces, one sees either positive or negative emotions. These specific faces had less weight in the overall structure of Study 2 - where items were added - compared with Study 1. These results seem to plead against recent research on the emotion-specificity of ability emotional intelligence, in that a different emotion processing might operate for different emotions (MacCann, Pearce, & Roberts, 2011; Schlegel, Grandjean, & Scherer, 2012). We found no emotion-specific factors for *perceiving*, nor for the other branches. Further research on emotion-specificity of ability emotional intelligence is however advised in this fairly new area of research.

Implications for ability emotional intelligence as standard intelligence

The present research further showed how structural results of rating-based ability emotional intelligence tests may be reconciled with conceptual, correlational and developmental criteria that have been put forward to establish ability emotional intelligence as standard intelligence (Mayer et al., 2000).

Conceptual criterion

The results for the two-factor model are for both studies in congruence with the theoretical underpinnings of the MSCEIT-YV and provide support for the four-branch emotional intelligence model, where the underlying emotional intelligence

abilities *perceiving*, *facilitating*, *understanding*, and *managing* define a global emotional intelligence factor (Mayer & Salovey, 1997). While the Procrustes weighted emotional intelligence component scores and the Procrustes weighted acquiescence component scores are derived independently for each of the four branches, they are organized into a general emotional intelligence factor and a general acquiescence factor. This indicates that it is justified to use an overall emotional intelligence score as indicative for ability emotional intelligence in case acquiescence is controlled for. As predicted, *perceiving* and *facilitating* show the lowest loadings, whereas *understanding* and *managing* show the highest loadings on the general emotional intelligence factor. These results are in line with prior theorizing and recent results on the MSCEIT (MacCann, Joseph, Newman, & Roberts, 2014) and the MSCEIT-YV (Rivers et al., 2012). Intercorrelations between *perceiving* and *facilitating* show that both branches are not redundant ($r_{\text{Study1}} = .24^{**}$, $r_{\text{Study2}} = .27^{**}$). This is an important finding because nowadays some MSCEIT studies have begun to exclude *facilitation* as a separate branch due to its high correlations with *perceiving* (i.e., $r = .90$; Fan, Jackson, Yang, Tang, & Zhang, 2010) and a better fit of the data (Gignac, 2005; Palmer, Gignac, Manocha, & Stough, 2005; Rossen, Kranzler, & Algina, 2008). As such, the results of the present research suggest to not throw the baby out with the bathwater and first further examine to which extent acquiescence in traditional consensus scoring may have an impact on the position of *facilitating* within the four-branch model. On average, correlations tend to be higher among the Procrustes weighted emotional intelligence component branch scores than between these scores and cognitive markers, supporting the distinctiveness of emotional intelligence from intelligence measures.

Correlational criterion

Inspecting whether intelligences are correlated with other intelligences is a standard method to determine whether an intelligence actually exists (Neisser et al., 1996). Because emotional intelligence has been seen as a new type of intelligence, parallel to verbal, perceptual-organizational, and broad-visualization intelligence, focusing on the specific content domain of emotions (Mayer, Roberts, & Barsade, 2008), it is particularly relevant to investigate how emotional intelligence is related to a comprehensive representation of other intelligences.

The observed correlations between the general emotional intelligence factor scores and a wide variety of intelligence measures (verbal, performance, and total intelligence, and abstract reasoning) were small to moderate. These correlations further substantiate MSCEIT evidence for the involvement of both crystallized aspects (mainly verbal) that require acculturated emotion knowledge accumulated over time as well as fluid aspects (mainly nonverbal) that require reasoning in ability emotional intelligence (Kong, 2014). The strongest correlations were not found with verbal intelligence but abstract reasoning. This finding is in line with Mayer and colleagues' (2008, p. 511) description of emotional intelligence as a form of intelligence, we see that they explicitly acknowledge a central position for reasoning: "Emotional intelligence concerns the ability to carry out accurate reasoning about emotions and the ability to use emotions and emotional knowledge to enhance thought." However, understanding the meaningfulness of reasoning in relation to emotions requires also incorporating the complexity of emotions. In contemporary emotion psychology, emotions may be seen as interrelated, synchronized processes of change in different involved components (such as appraisals, expressions, bodily sensations, action tendencies, and feelings), in reaction to the evaluation of a relevant (internal or external) event (Scherer, 1984, 2005). Emotional intelligence may then be seen as the ability to recognize interrelationships among emotion components and abstract emotion component patterns.

The observation that there was no correlation between intelligence measures and the general acquiescence factor scores stresses that we may be confident about the correlations between the general emotional intelligence factor scores and intelligence measures. This is not the case for correlations among the general emotional intelligence factor scores and measures of personality, alexithymia, and social and emotional impairment because these self-report measures themselves use rating scales. This implies that when traditional consensus scores are used, some correlations are likely to be overestimated and others to be underestimated because of acquiescence. For example, the general emotional intelligence factor scores and the general acquiescence factor scores showed both a positive correlation with extraversion, this may suggest an overestimation of the correlation between traditional consensus scored emotional intelligence and extraversion. Or, the general acquiescence factor scores showed

a positive correlation with anger, while the general emotional intelligence factor scores showed a negative correlation with anger. These opposite correlations may suggest a suppression of the correlation between traditional consensus scored emotional intelligence and anger. This may also, among other explanations, account for why existing evidence on the relationship between ability emotional intelligence and personality is still found to be equivocal. For example, Roberts, Schulze, and MacCann (2008) provided meta-analytic evidence on the MSCEIT for the strongest correlations of ability emotional intelligence with agreeableness (i.e., in the range of .18 to .27), correlations to a lesser extent with openness (i.e., in the range of .08 to .17), and the lowest correlations with extraversion, neuroticism, and conscientiousness (i.e., in the range of respectively .00 to .10, -.11 to -.02, and .03 to .12). In contrast, a recent study by Fiori and Antonakis (2011) endorses that openness ($r = .29$) and to a smaller extent agreeableness ($r = .20$) are substantially related to ability emotional intelligence. Furthermore, some MSCEIT studies found positive correlations with well-being (Brackett & Mayer, 2003) and mental health (Martins, Ramalho, & Morin, 2010), and negative correlations with anxiety (Bastian, Burns, & Nettelbeck, 2005; Jacobs et al., 2008), drug and alcohol use, and deviant behavior (Brackett, Mayer, & Warner, 2004). Other studies found no significant relations with general psychosocial functioning (Kee et al., 2009), and well-being (Zeidner & Olnick-Shemesh, 2010). Because no other ability emotional intelligence research has explicitly dealt with acquiescence, our understanding is here limited to tentative interpretations of the present results.

Developmental criterion

Age has been considered relevant to the evolution of emotional intelligence, as it has been seen as paramount to the evolution of other intelligence types (Mayer et al., 2000). Age differences have been found by Mayer et al. (2000), yet, these results were later questioned because an adult consensus scoring key was used for calculating the adolescent scores (Roberts et al., 2001). Further, evidence for age differences in youth is scarce and based on small samples or samples with restricted age range (Peters et al., 2009; Rivers et al., 2012). The present research expands previous work in this area by showing that age differences in large samples across a broad age range occur in raw data. Results indicated a

small, but non-negligible positive correlation between the general emotional intelligence scores and age, suggesting that when children and adolescents grow older they improve in emotional intelligence. Furthermore, also gender differences were found in the general emotional intelligence factor scores, with girls outperforming boys. Here, we replicate gender differences that have been found in a wide variety of MSCEIT studies (e.g., Joseph & Newman, 2010b). Finally, there was no significant correlation between age and the general acquiescence factor scores, nor were gender differences found for the general acquiescence factor scores.

Limitations and future research

First, the current studies were restricted to self-report assessments of personality, alexithymia and social and emotional impairment. In retrospect, it is clear that using additional objective measures would have been better practice, given the impact that acquiescence may have had on the self-report rating scale tests. Moreover, whilst previous research has failed to find a relationship between ability emotional intelligence and emotion information processing (Farrelly & Austin, 2007; Fiori & Antonakis, 2012; Roberts et al., 2006), accounting for acquiescence may potentially shed a different light on this non-finding.

Second, our findings for both studies are novel, in congruence with the outlined expectations, and robust, yet, replication may further our understanding of their theoretical and practical significance. We therefore propose that available raw MSCEIT(-YV) data could be reanalyzed using the provided approach. Such reanalyses could further clarify conceptual, correlational, and developmental inconsistencies that have been observed in research towards the four-branch ability emotional intelligence model.

Finally, future research is advised to address two questions from a cultural-comparative perspective. A first question is whether the observed internal structure in this individual sample is comparable to those that would emerge in other samples, thus, whether this particular structure would fit a similar overall structure across many samples. A second is which differences may occur in understanding items. Considerable agreement exists among emotion researchers that while basic, universal similarities exist, display rules may be culturally variable (e.g., Mesquita, 2001). First evidence with the MSCEIT is provided in this

area, showing that *perceiving* is indeed more universal while *understanding* and *managing* are more culture specific, yet, these results were based on traditional consensus scored data (Shao, Doucet, & Caruso, 2015). Maybe, the bipolar structure could serve as reference point, on which cultural specificity may be mapped.

Conclusion

Russell and Carroll (1999, p. 3) quoted that “science has repeatedly shown that things do not necessarily are the way they appear”. In agreement with this citation, the results of the present research showed that raw responses of rating-based ability emotional intelligence tests incorporate rather an amalgam of diverse aspects that are not all related to the ability emotional intelligence construct as is intended. A first study showed that the structure at item level for the rating-based MSCEIT-YV tests of *perceiving*, *facilitating*, and *managing* consists of bipolar emotional intelligence factors and unipolar acquiescence factors. Multidimensionality was only found for *perceiving*. A second study demonstrated that these findings are replicable and characteristic for other rating-based emotional intelligence tests too. For both studies, general emotional intelligence factor scores and not general acquiescence factor scores showed consistency with conceptual, correlational, and developmental intelligence standards, favoring the idea of ability emotional intelligence as a type of intelligence.

REFERENCES

- Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin*, 121, 219-245. doi:10.1037//0033-2909.121.2.219
- Barchard, K. A., Hensley, S., & Anderson, E. D. (2013). When proportion consensus scoring works. *Personality and Individual Differences*, 55, 14-18. doi:10.1016/j.paid.2013.01.017
- Bastian, V. A., Burns, N. R., & Nettelbeck, T. (2005). Emotional intelligence predicts life skills, but not as well as personality and cognitive abilities. *Personality and Individual Differences*, 39, 1135-1145. doi:10.1016/j.paid.2005.04.006
- Brackett, M. A., & Mayer, J. (2003). Convergent, discriminant, and incremental validity of competing measures of emotional intelligence. *Personality and Social Psychology Bulletin*, 29, 1147-1158. doi:10.1177/0146167203254596
- Brackett, M. A., Mayer, J., & Warner, R. (2004). Emotional intelligence and its relation to everyday behaviour. *Personality and Individual Differences*, 36, 1387-1402. doi:10.1016/S0191-8869(03)00236-8
- Brody, N. (2004). What cognitive intelligence is and what emotional intelligence is not. *Psychological Inquiry*, 15, 234-238. doi:10.1207/s15327965pli1503_03
- Brown, B. (1997). Raw scores of cognitive ability are real psychological variables: IQ is a hyperspace variable. In V.C. Shipman (Chair). IQ or cognitive ability? Symposium presented to the 9th Annual Convention of the American Psychological Society. Washington, DC.
- Burman D. D., Bitan T., & Booth, J. R. (2008). Sex differences in neural processing of language among children. *Neuropsychologia*, 46, 1349-1362. doi:10.1016/j.neuropsychologia.2007.12.021
- Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. Cambridge University Press: New York.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Côté, S. (2010). Taking the “intelligence” in emotional intelligence seriously. *Industrial and organizational psychology: Perspectives on science and practice*, 3, 127-130. doi: 10.1111/j.1754-9434.2010.01211.x

- Dillen, L., Fontaine, J. R. J., & Verhofstadt-Denève, L. (2009). Confirming the distinctiveness of complicated grief from depression and anxiety among adolescents. *Death Studies*, 33, 437-461. doi:10.1080/07481180902805673
- Fan, H. Y., Jackson, T., Yang, X. G., Tang, W. Q., & Zhang, J. F. (2010). The factor structure of the Mayer-Salovey-Caruso Emotional Intelligence Test V 2.0 (MSCEIT): A meta-analytic structural equation modeling approach. *Personality and Individual Differences*, 48, 781-785. doi:10.1016/j.paid.2010.02.004
- Fancher, R. E. (1985). *The intelligence men: Makers of the IQ controversy*. W.W. Norton: New York.
- Farrelly, D., & Austin, E. J. (2007). Ability EI as an intelligence? Associations of the MSCEIT with performance on emotion processing and social tasks and with cognitive ability. *Cognition and Emotion*, 21, 1043-1063. doi:10.1080/02699930601069404
- Fiori, M., & Antonakis, J. (2011). The ability model of emotional intelligence: Searching for valid measures. *Personality and Individual Differences*, 50, 329-334. doi:10.1016/j.paid.2010.10.010
- Fiori, M., & Antonakis, J. (2012). Selective attention to emotional stimuli: What IQ and openness do, and emotional intelligence does not. *Intelligence*, 40, 245-254. doi:10.1016/j.intell.2012.02.004
- Føllesdal, H., & Hagtvet, K. A. (2009). Emotional intelligence: The MSCEIT from the perspective of generalizability theory. *Intelligence*, 37, 94-105. doi:10.1016/j.intell.2008.08.005
- Geher, G., Warner, R. M., & Brown, A. S. (2001). Predictive validity of the emotional accuracy research scale. *Intelligence*, 29, 373-388. doi:10.1016/S0160-2896(00)00045-3
- Gignac, G. E. (2005). Evaluating the MSCEIT V2.0 via CFA: Comment on Mayer et al. (2003). *Emotion*, 5, 233-235. doi:10.1037/1528-3542.5.2.233
- Harlow, L. L. (2014). *The essence of multivariate thinking: Basic themes and methods* (2nd ed.). New York, NY: Routledge.
- Jacobs, M., Snow, J., Geraci, M., Vythilingam, M., Blair, R. J. R., Charney, D. S., ... Blair, K. S. (2008). Association between level of emotional intelligence

- and severity of anxiety in generalized social phobia. *Journal of Anxiety Disorders*, 22, 1487-1495. doi:10.1016/j.janxdis.2008.03.003
- Joseph, D. L., & Newman, D. A. (2010). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology*, 95, 54-78. doi:10.1037/a0017286
- Kee, K. S., Horan, W. R., Salovey, P., Kern, R. S., Sergi, M. J., Fiske, A. P., ... Green, M. F. (2009). Emotional intelligence in schizophrenia. *Schizophrenia Research*, 107, 61-68. doi:10.1016/j.schres.2008.08.016
- Kelly, G. A. (1955). *The psychology of personal constructs*. New York: Norton.
- Kong, D. T. (2014). Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT/MEIS) and overall, verbal, and nonverbal intelligence: Meta-analytic evidence and critical contingencies. *Personality and Individual Differences*, 66, 171-175. doi:10.1016/j.paid.2014.03.028
- Kort, W., Schittekatte, M., Bosmans, M., Compaan, E. L., Dekker, P. H., Vermeir, G., & Verhaeghe, P. (2005). *WISC-III - NL: Wechsler Intelligence Scale for Children. Handleiding en verantwoording [Dutch manual]*. Amsterdam: Harcourt Test Publishers.
- Langner, O., Dotsch, R., Bijlstra, G., Wigboldus, D. H. J., Hawk, S. T., & van Knippenberg, A. (2010). Presentation and validation of the Radboud Faces Database. *Cognition and Emotion*, 24, 1377-1388. doi:10.1080/02699930903485076
- Legree, P. J. (1995). Evidence for an oblique social intelligence factor. *Intelligence*, 21, 247-266. doi:10.1016/0160-2896(95)90016-0
- Legree, P. J., Martin, D. E., & Psotka, J. (2000). Measuring cognitive aptitude using unobstrusive knowledge tests: a new survey technology. *Intelligence*, 28, 291-308. doi:10.1016/S0160-2896(99)00039-2
- Legree, P. J., Psotka, J., Tremble, T. R., & Bourne, D. (2005). Using consensus based measurement to assess emotional intelligence. In R. Schulze & R. Roberts (Eds.). *International handbook of emotional intelligence* (pp 99-123), Berlin, Germany: Hogrefe & Huber.
- Lorenzo-Seva, U., & ten Berge, J. M. F. (2006). Tucker's congruence coefficient as a meaningful index of factor similarity. *Methodology*, 2, 57-64. doi:10.1027/1614-2241.2.2.57

- Lumley, M. A., Gustavson, B. J., Ty Partridge, R., & Labouvie-Vief, G. (2005). Assessing alexithymia and related emotional ability constructs using multiple methods: Interrelationships among measures. *Emotion*, 5, 329-342. doi:10.1037/1528-3542.5.3.329
- MacCann, C., Joseph, D., Newman, D., Roberts, R. D. (2014). Emotional intelligence is a second-stratum factor of intelligence: Evidence from hierarchical and bifactor models. *Emotion*, 14, 358-374. doi:10.1037/a0034755
- MacCann, C., Pearce, N., & Roberts, R. D. (2011). Emotional Intelligence as assessed by situational judgment and emotion recognition tests: Building the nomological net. *Psychological Topics (Psihologijske Teme)*, 20, 393-412.
- MacCann, C., Roberts, R. D., Matthews, G., & Zeidner, M. (2004). Consensus scoring and empirical option weighting of performance-based emotional intelligence (EI) tests. *Personality and Individual Differences*, 36, 645-662. doi:10.1016/S0191-8869(03)00123-5
- MacCann, C., Wang, L., Matthews, G., & Roberts, R. D. (2010). Emotional intelligence and the eye of the beholder: Comparing self- and parent-rated situational judgments in adolescents. *Journal of Research in Personality*, 44, 673-676. doi:10.1016/j.jrp.2010.08.009
- Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Personality and Individual Differences*, 49, 554-564. doi:10.1016/j.paid.2010.05.029
- Matthews, G., Zeidner, M., & Roberts, R. D. (2004). Seven myths about emotional intelligence. *Psychological Inquiry*, 15, 179-196. doi:10.1207/s15327965pli1503_01
- Maul, A. (2012a). The validity of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) as a measure of emotional intelligence. *Emotion Review*, 4, 394-402. doi:10.1177/1754073912445811
- Maul, A. (2012b). Higher standards of validity evidence are needed in the measurement of emotional intelligence. *Emotion Review*, 4, 411-412. doi:10.1177/1754073912446357

- Mayer, J. D., Caruso, D. R., & Salovey, P. (2000). Emotional intelligence meets traditional standards for an intelligence. *Intelligence*, 27, 267-298. doi:10.1016/S0160-2896(99)00016-1
- Mayer, J. D., DiPaolo, M., & Salovey, P. (1990). Perceiving affective content in ambiguous visual stimuli: a component of emotional intelligence. *Journal of Personality Assessment*, 54, 772-781. doi:10.1080/00223891.1990.9674037
- Mayer, J. D., Roberts, R. D., & Barsade, S. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, 59, 507-536. doi:10.1146/annurev.psych.59.103006.093646
- Mayer, J. D., & Salovey, P. (1993). The intelligence of emotional intelligence. *Intelligence*, 17, 433-442. doi: 10.1016/0160-2896(93)90010-3
- Mayer, J., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. J. Sluyter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3-34). New York: Basic Books.
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2000). *Models of emotional intelligence*. In R. J. Sternberg (Ed.), *Handbook of intelligence* (pp. 396-420). New York, NY: Cambridge University Press.
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2002). *The Mayer, Salovey, and Caruso Emotional Intelligence Test: Technical manual*. Toronto: Multi-Health Systems.
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2015). *Mayer-Salovey-Caruso Emotional Intelligence Test: YRV Researcher's guide*. Toronto: Multi-Health Systems.
- Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2001). Emotional intelligence as a standard intelligence. *Emotion*, 1, 232-242. doi:10.1037//1528-3542.1.3.232
- Mayer, J. D., Salovey, P., Caruso, D., & Sitarenios, G. (2003). Measuring emotional intelligence with the MSCEIT V2.0. *Emotion*, 3, 97-105. doi:10.1037/1528-3542.3.1.97
- McCrae, R. R., Zonderman, A. B., Costa, P. T., Jr., Bond, M. H., & Paunonen, S. V. (1996). Evaluating replicability of factors in the Revised NEO Personality Inventory: Confirmatory factor analysis versus Procrustes rotation. *Journal*

- of Personality and Social Psychology*, 70, 552-566. doi:10.1037/0022-3514.70.3.552
- Mervielde, I., & De Fruyt, F. (1999). Construction of the Hierarchical Personality Inventory for Children. In I. Mervielde, I. J. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality psychology in Europe* (Vol. 7, pp. 107-127). Tilburg: University Press.
- Mesquita, B. (2001). Culture and emotion. Different approaches to the question. In T. J. Mayne & G. A. Bonanno (Eds.), *Emotions. Current issues and future directions* (pp. 214-250). New York: Guilford Press.
- Mulaik, S. A. (1972) *The foundations of factor analysis*. New York: McGraw Hill.
- Muthén, L. K., & Muthén, B. O. (1998-2011). *Mplus user's guide* (6th ed.). Los Angeles: Authors.
- Neisser, U., Boodoo, G., Bouchard, T. J., Boykin, A. W., Brody, N., Ceci, S. J., ... Urbina, S. (1996). Intelligence: Knowns and unknowns. *American Psychologist*, 51, 77-101. doi:10.1037/0003-066X.51.2.77
- Palmer, B. R., Gignac, G., Manocha, R., & Stough, C. (2005). A psychometric evaluation of the Mayer-Salovey-Caruso Emotional Intelligence Test Version 2.0. *Intelligence*, 33, 285-305. doi:10.1016/j.intell.2004.11.003
- Peters, C., Kranzler, J. H., & Rossen, E. (2009). Validity of the Mayer-Salovey-Caruso Emotional Intelligence Test: Youth Version-Research Edition. *Canadian Journal of School Psychology*, 24, 76-82. doi:10.1177/0829573508329822
- Raven, J. C. (1960). *Guide to the standard progressive matrices*. London: H.K. Lewis & Co. Ltd.
- Rieffe, C., Oosterveld, P., & Terwogt, M. M. (2006). An alexithymia questionnaire for children: Factorial and concurrent validation results. *Personality and Individual Differences*, 40, 123-133. doi:10.1016/j.paid.2005.05.013
- Rivers, S. E., Brackett, M. A., Reyes, M. R., Mayer, J. D., Caruso, D. R., & Salovey, P. (2012). Measuring emotional intelligence in early adolescence with the MSCEIT-YV: Psychometric properties and relationship with academic performance and psychosocial functioning. *Journal of Psychoeducational Assessment*, 30, 344-366. doi:10.1177/0734282912449443

- Roberts, R. D., Schulze, R., & MacCann, C. (2008). The measurement of emotional intelligence: A decade of progress? In G. Boyle, G. Matthews & D. Saklofske (Eds.), *The SAGE handbook of personality theory and assessment* (pp. 461-482). New York: Sage.
- Roberts, R. D., Schulze, R., O'Brien, K., MacCann, C., Reid, J., & Maul, A. (2006). Exploring the validity of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) with established emotions measures. *Emotion*, 6, 663-669. doi:10.1037/1528-3542.6.4.663
- Roberts, R. D., Zeidner, M., & Matthews, G. (2001). Does emotional intelligence meet traditional standards for an intelligence? Some new data and conclusions. *Emotion*, 1, 196-231. doi:10.1037//1528-3542.1.3.196
- Rossen, E., Kranzler, J. H., & Algina, J. (2008). Confirmatory factor analysis of the Mayer-Salovey-Caruso emotional intelligence test version 2.0 (MSCEIT). *Personality and Individual Differences*, 44, 1258-1269. doi:10.1016/j.paid.2007.11.020
- Russell, J. A. (1979). Affective space is bipolar. *Journal of Personality and Social Psychology*, 37, 345-356. doi:10.1037/0022-3514.37.3.345
- Russell, J. A., & Carroll, J. M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin*, 125, 3-30. doi:10.1037/0033-2909.125.1.3
- Russell, J. A., & Mehrabian, A. (1977). Evidence for a three-factor theory of emotions. *Journal of Research in Personality*, 11, 273-294. doi:10.1016/0092-6566(77)90037-X
- Salovey, P., & Mayer, J. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, 9, 185-211. doi:0.2190/DUGG-P24E-52WK-6CDG
- Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K. R. Scherer & P. Ekman (Eds.). *Approaches to emotion* (pp. 293-317). Hillsdale, NJ: Erlbaum.
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44, 693-727. doi:10.1177/0539018405058216
- Schlegel, K., Grandjean, D., & Scherer, K. (2012). Emotion recognition: Unidimensional ability or a set of modality- and emotion-specific skills? *Personality and Individual Differences*, 53, 16-21. doi:10.1016/j.paid.2012.01.026

- Schweizer, K. (2010). Some guidelines concerning the modeling of traits and abilities in test construction. *European Journal of Psychological Assessment*, 26, 1-2. doi:10.1027/1015-5759/a000001
- Shao, B., Doucet, L., & Caruso, D. R. (2015). Universality versus cultural specificity of three emotion domains: Some evidence based on the cascading model of emotional intelligence, *Journal of Cross-Cultural Psychology*, 46, 229-251. doi:10.1177/0022022114557479
- Van de Vijver, F. J. R., & Leung, K. (1997). *Methods and data analysis for cross-cultural research*. Newbury Park, CA: Sage.
- Van Vaerenbergh, Y., & Thomas, T. D. (2013). Response styles in survey research: A literature review of antecedents, consequences, and remedies. *International Journal of Public Opinion Research*, 25, 195-217. doi:10.1093/ijpor/eds021
- Veirman, E., & Fontaine, J. R. J. (2014): Revisiting the dimensional structure of the emotion domain, *Cognition and Emotion*, doi:10.1080/02699931.2014.963518
- Zeidner, M., & Olnick-Shemesh, D. (2010). Emotional intelligence and subjective well-being revisited. *Personality & Individual Differences*, 48, 431-436. doi:10.1016/j.paid.2009.11.011
- Zeidner, M., Shani-Zinovich, I., Matthews, G., & Roberts, R. D. (2005). Assessing emotional intelligence in gifted and non-gifted high school students: outcomes depend on the measure, *Intelligence*, 33, 369-391. doi:10.1016/j.intell.2005.03.001

CHAPTER 6

General Discussion

Abstract

The main objective of this dissertation was to examine and improve the validity of two maximum performance measures that have been developed to assess emotional intelligence in children and adolescents, the LEAS-C and the MSCEIT-YV. This objective was pursued through four research questions that formed the basis of the empirical studies presented in Chapter 2, 3, 4, and 5. These research questions focused on (1) the validity of the original LEAS-C in children and adolescents, (2) the validity of an adapted version of the LEAS-C in children and adolescents, (3) the cognitive representation of the emotion domain in children, adolescents, students, and adults, and (4) the validity of the original MSCEIT-YV and an adapted and extended version of the MSCEIT-YV in children and adolescents. The empirical findings of these studies and the main contributions are briefly summarized and discussed in this final chapter. Furthermore, several strengths, limitations and directions for future research are proposed. This chapter closes with a general conclusion of the doctoral dissertation.

RESEARCH OVERVIEW AND CONTRIBUTIONS

This dissertation started with a comprehensive summary of the literature on emotional intelligence. It presented a historical view on emotional intelligence research and described the traditional theoretical and measurement approaches to emotional intelligence. Moreover, it justified the choice for the ability model approach and the use of maximum performance measurement. Then, it highlighted that the ability model approach to emotional intelligence was understudied in childhood and adolescence and validity evidence for the few available maximum performance measures for use in childhood and adolescence was scarce and inconclusive. Therefore, the main objective of this dissertation was to investigate and improve the validity of two state-of-the-art maximum performance measures for the assessment of emotional intelligence in children and adolescents: the LEAS-C and the MSCEIT-YV. More specifically, this main objective was investigated through four research questions that related to: (1) the validity of the original LEAS-C in children and adolescents, (2) the validity of an adapted version of the LEAS-C in children and adolescents, (3) the cognitive representation of the emotion domain in children, adolescents, students, and adults, and (4) the validity of the original MSCEIT-YV and an adapted and extended version of the MSCEIT-YV in children and adolescents. These research questions were addressed in six empirical studies that were presented in Chapter 2, 3, 4, and 5. The following sections briefly summarize the main findings and contributions of this dissertation and explicit how they answer the four research questions.

Research question 1: Is the original LEAS-C a valid measure to assess emotional awareness?

This first research question focused on the validity of the original LEAS-C in childhood and adolescence. When this dissertation started, the LEAS-C was believed to be a valid assessment of emotional awareness, yet, only one study in literature reported preliminary validity evidence on this LEAS-C (Bajgar, Ciarrochi, Lane, & Deane, 2005). This study was concerned with the construction and initial validation of the LEAS-C. It was executed in a small sample ($N = 51$) with a restricted age range (10 to 11 years), no internal structure analyses were performed, the network of convergent and discriminant relationships was

restricted to a limited breadth of correlates, and the key assumption of the LEA model that emotional awareness develops with age was tested against normative adult data and not supported. The first empirical study of this dissertation (Chapter 2) therefore extended the preliminary validity evidence of the original LEAS-C and tested age differences in emotional awareness in a substantially larger sample ($N = 318$) with a much broader age range (10 to 17 years).

First, results indicated that the reliability was found to be acceptable for self-, other-, and total-awareness scores in agreement with the study of Bajgar et al. (2005). Second, the internal structure was tested for different theoretical and design-driven models. The structural results indicated that the total-awareness scores fitted the a priori theorized one-factor structure, implying that the total-awareness score, which is mostly used in assessment, can be justified. Further, best fit was found for a design-driven two-factor structure on self-awareness and other-awareness scores. However, because these self and other factors were highly correlated, it remains appropriate to use a total-awareness score. Third, a much broader network of convergent and discriminant relationships was investigated. Our results showed that the pattern of correlations for total-awareness scores was in line with the theoretical framework of the LEAS-C and prior findings with the LEAS-C (Bajgar et al., 2005) and the LEAS (e.g., Ciarrochi, Scott, Deane, & Heaven, 2003; Lane et al., 1996; Waller & Scheidt, 2004). We observed positive correlations with intelligence (verbal intelligence, overall intelligence, and abstract reasoning), personality (openness, agreeableness, and conscientiousness), emotional intelligence (understanding emotions, managing emotions, and overall emotional intelligence), negative correlations with alexithymia (externally-oriented thinking), and no correlations with social and emotional impairment (self-concept, depression, anxiety, anger, and disruptive behaviors). Moreover, gender differences were looked at. We confirmed that girls outperformed boys for self-, other-, and total-awareness scores (Bajgar et al., 2005). An finally, age differences were investigated. Despite a large sample with a broad age range was used in this study, we were not able to find age differences in self-, other-, and total-awareness scores.

So, the answer for the first research question *Is the original LEAS-C a valid measure to assess emotional awareness?* should be “no, but”. The lack of age differences in a substantially larger sample with a much broader age range

questions the validity of the LEAS-C. As the LEA model is rooted in developmental theorizing, that is, Piaget's (Flavell, 1962) theory of cognitive development and Werner and Kaplan's (1963) theories of symbolization and language development (Lane & Schwartz, 1987), a valid measurement of emotional awareness in children and adolescents should demonstrate an increase in emotional awareness with age. However, the tested models pointed to a straightforward internal structure, the network of convergent and discriminant relationships did show the expected pattern of relationships with intelligence, personality, emotional intelligence, alexithymia, and social and emotional impairment, and the gender differences were confirmed, which provided evidence for the potential value of the LEAS-C.

Research question 2: Can the validity of the original LEAS-C be improved by redesigning the instructions and the scoring procedure based on the componential emotion approach?

This second research question focused on the validity of an adapted version of the LEAS-C in childhood and adolescence. The original LEAS-C is based upon a cognitive-developmental theory, but is not embedded in a clear theoretical framework on emotions. The instructions and the scoring procedure are mainly focused on feelings, while contemporary emotion psychology recognizes a component process definition to emotion with the different emotion components of appraisal, action tendency, bodily reaction, expression, and feeling considered important (Scherer, 2005). The word feel in the instructions may have resulted in unwanted response variation because it is often differentially interpreted in daily life (Mulligan & Scherer, 2012). Moreover, the scoring procedure cannot account for the different emotion components that may be represented in the descriptions because it only takes information on the highest reached level of emotional awareness into account for each perspective in each scenario, irrespective whether descriptions contain information on other levels. The second empirical study of this dissertation (Chapter 3) therefore attempted to improve the validity of the original LEAS-C by adapting the instructions and the scoring procedure in agreement with the componential emotion approach. The instructions were changed from a focus on feelings to a focus on experience, while respondents were instructed to attend to all emotion components. Further, a new

componential scoring procedure was developed that takes the different emotion components that are represented in the descriptions into account. Because the changes required respondents to provide more information in their descriptions, the adapted LEAS-C contained only six scenarios to reduce the risk of tiredness and overload. This study moreover tested age differences in emotional awareness for this adapted version of the LEAS-C. The data were collected in a large sample ($N = 574$) with a broad age range (8 to 16 years) and scored with both the original and the componential scoring procedure.

First, both the original and the componential scored data of the adapted LEAS-C were found reliable for self-, other-, and total-awareness scores. In light of the studies that up to now examined the reliability of the original LEAS-C (Bajgar et al., 2005; Marchetti et al., 2010; Veirman et al., 2011), similar internal consistency coefficients were found with the original scoring procedure, and substantially higher internal consistency coefficients were found with the componential scoring procedure. The better quality of the componential scoring procedure, compared to the original one, was further supported by a high inter-rater reliability for self-, other-, and total-awareness scores. Second, the internal structure was investigated. Structural results showed that the total-awareness scores fitted a one-factor structure for both scoring procedures. Moreover, the self-awareness and other-awareness scores also fitted a one-factor structure for both scoring procedures, with best fit found for the componential scored data. This finding contradicts the support for a two-factor model for self-awareness and other-awareness scores that was found in Chapter 1 with the original LEAS-C. Possibly the different aspects of the emotion process that are salient from the self- and the other-perspective, have disappeared in the adapted LEAS-C because the componential instructions stimulated to report on the whole emotion process for both perspectives. Third, the network of convergent and discriminant relationships was examined. Our results showed that the pattern of correlations for total-awareness scores was in line with theoretical expectations and previous findings with the original LEAS-C (Bajgar et al., 2005; Marchetti et al., 2010; Veirman et al., 2011). For the original and the componential scoring, we observed positive correlations with intelligence (verbal intelligence, overall intelligence, abstract reasoning), personality (extraversion and openness), and emotional intelligence (facilitating thoughts, understanding emotions, managing

emotions, and overall emotional intelligence), negative correlations with alexithymia (externally-oriented thinking and overall alexithymia), and no correlations with social and emotional impairment (i.e., self-concept, depression, anxiety, anger and disruptive behaviors). Moreover, gender differences were inspected and confirmed that girls outperformed boys for self-, other-, and total-awareness scores for both scoring procedures. Finally, the expected age differences in self-, other-, and total-awareness scores were now observed. The age differences emerged with the original scoring procedure and were even more pronounced when the componential scoring procedure was used. The adapted version of the LEAS-C thus fully supports Lane and Schwartz's (1987) statement that emotional awareness develops with age.

So, the answer for the second research question *Can the validity of the original LEAS-C be improved by redesigning the instructions and the scoring procedure based on the componential emotion approach?* should be "yes". By using a component process definition to emotion, we were successful in adapting the instructions and the scoring procedure of the original LEAS-C. For the adapted LEAS-C, the tested models pointed to a clear-cut internal structure, the network of convergent and discriminant relationships showed the expected pattern of relationships with intelligence, personality, emotional intelligence, alexithymia, and social and emotional impairment, gender differences were confirmed, and most importantly also age differences were revealed.

Research question 3: Do children and adolescents represent emotions the same way as students and adults do?

This third research question addressed the comparability of the cognitive representation of the emotion domain for children, adolescents, students and adults. The scoring procedure that is applied to score the responses of the MSCEIT-YV is primarily based on adult criteria that combine theoretical criteria, research findings, and expert judgements. Consensus scoring based on a large sample of children and adolescents was thought not to be appropriate. In the initial normative sample, children and adolescents identified for many items not the best suited answer as being correct (Papadogiannis, Logan, & Sitarenios, 2009). It may however be questioned whether adult criteria can be used to evaluate the correctness of responses to emotion-related questions for children

and adolescents. The third and fourth empirical study of this doctoral dissertation (Chapter 4) therefore investigated whether children and adolescents represent emotions the same way as students and adults do. These studies focused on emotion words because it has been demonstrated that emotion words contain information on all components of the emotion process (Fontaine, Scherer, Soriano, 2013) and emotion words are part of virtually every item in the MSCEIT-YV.

The third empirical study of this dissertation (Chapter 4) was performed in a large sample of participants from mid-childhood up to early adulthood ($N = 5071$). A representative set of free listed emotion terms was selected, using a component process definition to emotion (Scherer, 2005). These emotion terms included nearly all GRID emotion terms, a representative set of emotion terms that is based on often used words in emotion research and words that are derived from empirical findings in adults (Fontaine, Scherer, & Soriano, 2013). Generally, girls reported more emotion terms than boys, more emotion terms were reported with increasing age, and this age effect was more pronounced for girls compared to boys. The results of this study are important for emotion research as this study was the first to examine the emotion lexicon at this scale by way of free listing, showing that the number and range of emotion terms broadens and becomes more fine-grained with age. These results may signify that gender and age differences can be expected to occur in measures that predominantly rely on emotion terms.

In the fourth empirical study of this dissertation (Chapter 4), a similarity rating task was developed, based on ideas of the GRID research that studied the components of emotional meaning (Fontaine, Scherer, & Soriano, 2013), and administered in a large sample of children, adolescents, students, and adults ($N = 1184$). The results showed that the pairwise similarities were more reliable for students and adults than for children and adolescents. However, the average similarities of the child-adolescent sample, the student sample, and the adult-sample could all be adequately represented in the same four-dimensional space. With increasing age, children and adolescents become more accurate in representing the emotion terms along the same four dimensions that also structure the adult representation. Besides an age effect on the reliability of the similarity ratings, also the salience of the four dimensions differed between the

child-adolescent sample on one hand and the student and the adult samples on the other hand. Moreover, an age effect in the child-adolescent sample was demonstrated. It was observed that the valence dimension becomes more salient and the power, arousal, and novelty dimensions become relatively less salient with increasing age of children. This suggests that children and adolescents become better in understanding how different emotion processes resemble one another in function of their hedonic tone. The results of this study add to the field of emotion research as they show for the first time in literature that when no emotion features are primed and a simple similarity rating task with a representative set of emotion terms is used, a four dimensional structure with valence, power, arousal, and novelty is observed among children and adolescents, students and adults. Furthermore, these findings can justify the use of adult criteria in scoring child and adolescent measurements in emotional intelligence research. Both adults and children and adolescents organize the emotion domain along the same underlying dimensions. Moreover, it has to be noted that the results of these studies directly formed the basis for the development of a new additional set of emotional intelligence items for the second empirical study on the MSCEIT-YV in Chapter 5 of this dissertation. In these items, emotion terms are compared to other emotion terms.

So, the answer for the third research question *Do children and adolescents represent emotions the same way as students and adults do?* should be “yes”. Children and adolescents reported similar emotion terms than those that are commonly used in adult research, and children and adolescents evaluate emotion terms along the same dimensions of valence, power, arousal, and novelty as students and adults do.

Research question 4: Does a scoring directly based on the raw responses of rating-based ability MSCEIT-YV tests confirms the conceptual, correlational, and developmental criteria that are used to decide on emotional intelligence as a standard intelligence?

Traditionally, either expert or consensus scoring have been applied to score maximum performance emotional intelligence tests. These scoring approaches, however, have been heavily criticised (e.g., Maul, 2012a, 2012b; Wilhelm, 2005). We developed a theoretical framework to understand how raw responses of

rating-based MSCEIT-YV and similar tests are structured, and investigated the value of this framework in the fifth and sixth empirical study of this doctoral dissertation (Chapter 5). First, a bipolar emotional intelligence factor was hypothesized for rating-based MSCEIT-YV tests and similar tests. This hypothesis was based on the Personal construct theory (Kelly, 1955). According to this theory, all human thinking is bipolar in nature. Moreover, it was hypothesized that acquiescence and possibly multidimensionality mask the emergence of the theoretically expected bipolar emotional intelligence factors. These hypotheses were derived from groundbreaking research on the bipolarity of affect (Russell, 1979; Russell & Carroll, 1999). The results were also related to the three criteria (i.e., conceptual, correlational, and developmental) that Mayer, Salovey, and Caruso (2000) used to interpret emotional intelligence as a legitimate intelligence.

A first study was performed in a large sample ($N = 630$) with a broad age range (10 to 17 years) on the rating-based MSCEIT-YV perceiving, facilitating, and managing tests. A second study was also executed in a large sample ($N = 664$) with a broad age range (8 to 16 years) and looked additionally to a rating version of the MSCEIT-YV understanding test and additional sets of items for perceiving, facilitating, and managing.

Our results showed evidence for the existence and generalizability of a bipolar emotional intelligence factor and a unipolar acquiescence factor for all rating-based tests. This structure was found in each study for each split-half sample and was also replicated for the complete sample, showing the robustness of the results. A two-factor model with a general emotional intelligence factor and a general acquiescence factor provided a good fit for the individual emotional intelligence and acquiescence scores for all rating-based tests. The general emotional intelligence factor showed the expected pattern of correlations with external criteria, gender differences in favor for girls, and growth with age.

So, the answer for the fourth research question *Does a scoring directly based on the raw responses of rating-based ability MSCEIT-YV tests confirms the conceptual, correlational, and developmental criteria that are used to decide on emotional intelligence as a standard intelligence?* should be “yes”. Evidence on the validity of ability emotional intelligence does not necessarily have to rely on expert or consensus scoring, a coherent interpretable ability emotional

intelligence construct can be found on the basis of the raw data of rating-based tests. The results of both studies are important for the emotional intelligence domain, because they showed for the first time in literature that a bottom-up investigation of the internal structure of rating-based ability emotional intelligence tests offers a fruitful alternative to the traditional scoring procedures. They further highlighted that these traditional scoring procedures are vulnerable to acquiescence. Both studies stress the importance of adopting this new developed framework to further examine the validity of this type of measurements.

STRENGTHS, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

The studies that were performed in this dissertation are characterized by two major strengths. First, they all consisted of both large and heterogeneous (in terms of age, gender, and education level) samples. The robust results of these studies for the LEAS-C and the MSCEIT-YV can thus be safely generalized to the wider population of children and adolescents. Second, these studies all systematically focused on key validity issues such as the internal structure, the network of convergent and discriminant relationships, and the scoring, resulting in a comprehensive evaluation of the validity of the LEAS-C and the MSCEIT-YV.

In spite of the strengths and contributions of the six studies that were conducted, the following paragraphs also describe some limitations that should be acknowledged. Also, possible avenues for future research are suggested.

First, while the current dissertation extended existing validity evidence on the original LEAS-C in Chapter 2 and improved its validity by developing an adapted LEAS-C in Chapter 3, it was found that the self- and the other perspective were either very highly correlated in the original LEAS-C, or even non-distinguishable in the adapted LEAS-C. Future research that is interested in assessing differences between the self- and the other perspective may therefore need to develop other formats than the paper-and-pencil format. Because in everyday social interactions, people observe verbal and nonverbal behavior of others, a video-based format would provide a more realistic and vivid multimodal representation of the scenarios. For example, while the paper-and-pencil format with written scenarios for the adapted LEAS-C resulted in descriptions that contain mainly appraisals, action tendencies, and feelings, the descriptions could

show a larger difference between self- and other descriptions - with for instance much more reference to expressive information in the other-perspective - when the verbal and nonverbal behavior of the characters in the scenarios can be observed.

Second, despite the fact that the expected pattern of correlations was consistently confirmed for the original LEAS-C (Chapter 2), the adapted LEAS-C (Chapter 3), the original MSCEIT-YV, and the adapted and extended MSCEIT-YV (Chapter 5), the correlations with self-concept and psychopathology were either not significant or small. Two possible post hoc explanations can be formulated.

A first explanation is related to the sample composition. All samples in this dissertation were community samples. It would be interesting for future research to move to clinical samples, and also establish the validity of the instruments in these samples. For example, the adapted LEAS-C could be administered in children and adolescents with eating disorders, depression, or autism spectrum disorders. It could be investigated whether the adapted LEAS-C is able to reveal impairments in emotional awareness in these samples in comparison to healthy controls. A step further, it would also be interesting to examine whether a baseline level of emotional awareness at the start of therapy would be improved during therapy. From a prevention perspective, it may also be fruitful to know whether the adapted LEAS-C would be a good tool for school psychologists to screen children and adolescents on emotional awareness deficits, in order to provide early supportive counseling.

A second explanation is that the emotion-related abilities that are measured by these tests are helpful, but not of critical importance for intrapersonal functioning. As we focused mainly on intrapersonal functioning, future research could provide valuable insight on how these tests relate to interpersonal functioning. For example, children and adolescents that show a high emotional intelligence on the MSCEIT-YV may be better in starting friendships and maintaining relationships, may be more comfortable in group discussions and better cooperate with other pupils for class assignments. In our studies on the original LEAS-C (Chapter 2), the adapted LEAS-C (Chapter 3), the original MSCEIT-YV, and the adapted and extended MSCEIT-YV (Chapter 5), we found that emotional intelligence is related to extraversion and agreeableness.

These personality traits serve a social purpose. Extraversion includes facets of energy, expressiveness, optimism, and shyness. People who are high in extraversion tend to search for social stimulation and occasions to engage with others. Agreeableness comprises facets of trust, straightforwardness, altruism, dominance, egocentrism, compliance and irritability. People who are high in agreeableness tend to believe that most people are trustworthy, decent, and honest (e.g., De Fruyt et al., 2006; Graziano & Eisenberg, 1997; John & Srivastava, 1999). Furthermore, recent advancements in the literature on ability emotional intelligence indeed subscribe the importance of emotional intelligence for interpersonal functioning. For instance, it has been shown that emotional intelligence is inversely related to loneliness in adolescence and early adulthood (e.g., Wols, Scholte, & Qualter, 2015; Zhang, Zou, Wang, & Sima Finy, 2015; Zysberg, 2012).

Third, the current dissertation offered a powerful framework to come to a less biased measurement of emotional intelligence by distinguishing emotional intelligence and acquiescence in rating-based MSCEIT-YV tests (Chapter 5). As such, an important step is made to raise awareness among researchers that (1) it is of crucial importance to remove acquiescence from scores that intend to reflect emotional intelligence and (2) part of the relationships that have been previously reported with consensus and expert scored rating-based emotional intelligence tests have to be attributed to acquiescence. Moreover, these findings pave the way for two lines of future research.

A first line of research can examine the relationship between the MSCEIT and emotion processing tasks. Recent studies failed to find an association between the MSCEIT and emotion information processing, concluding that the MSCEIT may be tapping into just crystallized intelligence (Farrelly & Austin, 2007; Fiori & Antonakis, 2012; Roberts et al., 2006). However, this conclusion may be premature because acquiescence may have concealed the association between the MSCEIT and emotion information processing tasks. As it has been claimed that emotional intelligence concerns the capacity “to carry out sophisticated information processing about emotions and emotion-relevant stimuli and to use this information as a guide to thinking and behavior” (Mayer, Salovey, & Caruso, 2008, p. 503), it is problematic for the validity of the MSCEIT

that hitherto no support is found for any relationship with experimental emotion processing tasks.

A second line of research can explore the impact of other response biases that may confound scores. For example, future research could examine the impact of extremity. While it may be expected that extremity has an impact on the scores, distinguishing extremity from valid differences in scores is a real challenge. Our results demonstrated that children and adolescents who have a higher emotional intelligence rate the items that represent correct responses higher and rate the items that represent incorrect responses lower on the response scales. Thus, within the assessment of emotional intelligence, extreme responding on rating scales also points to ability.

Fourth, now that the current dissertation established age differences in emotional intelligence in cross-sectional samples, future studies could include longitudinal designs to follow up the same cohorts from childhood, over adolescence, into adulthood. These designs may allow to investigate how emotion-related abilities evolve over time and which trajectories they follow.

Fifth, it is important to further investigate method effects on maximum performance emotional intelligence instruments. Most research in this area has been concerned with the relationship between self-reported emotional intelligence and performance based measurement (e.g., O'Connor & Little, 2003; Van Rooy, Viswesvaran, & Pluta, 2005; Warwick & Nettelbeck, 2004). However, it would also be interesting to compare different maximum performance assessment procedures for the different branches of the MSCEIT-YV. It would allow us to determine how well these different tests converge in the assessment of emotional intelligence, how much variance can be accounted for by methodological factors, and how much variance can be accounted for the construct they intend to measure. In the current dissertation, a first attempt has been made for the emotion-related ability of understanding emotions. While the MSCEIT-YV is considered as an integrative measure of all emotion-related abilities, including understanding emotions, the LEAS-C has been categorized as just a measure of understanding emotions (e.g., Mayer, Roberts, & Barsade, 2008). Our results, however, suggest that both measures of understanding emotions are not interchangeable. As can be seen in Chapter 2 and Chapter 3, only small correlations were observed between the LEAS-C (self, other, and total

scores) and the MSCEIT-YV (branch scores as well as total scores) in general ($-.01 \leq r \leq .24$). Although the highest correlations for the LEAS-C self, other, and total scores are found with either the MSCEIT-YV understanding emotions branch scores ($.16 \leq r \leq .21$) or the MSCEIT-YV total emotional intelligence scores ($.17 \leq r \leq .24$), we actually expected at least to find moderate correlations among tests that are considered to measure the same subconstruct. These small correlations are in line with the small correlations that have been found between the LEAS and the MSCEIT in a prior study of Ciarrochi, Caputi, and Mayer (2003), suggesting that both tests measure distinct domains. A post-hoc interpretation of these low correlations may be that these tests each measure understanding at a different level. While the LEAS-C deals with the complexity of how people construe emotional experiences, the MSCEIT-YV rather deals with how well people conform to the societal norm with respect to emotional experiences. So, the complexity of emotional experiences does not necessarily has to correspond to the content of the emotional experiences. Our findings suggest that both tests are rather complementary than equivalent measures. Future research is yet needed to further disentangle the meaning of this complementarity and thus the specific usefulness of both tests in practice. Likewise, future research that is interested in the ability of managing emotions may compare the rating-based managing MSCEIT-YV test with for instance the recently developed child version of the multiple choice Situational Test for Emotion Management (STEM; MacCann, Fogarty, Zeidner, & Roberts, 2011; MacCann, Wang, Matthews, & Roberts, 2010).

Finally, further research could see how the MSCEIT-YV could be improved. For example, despite Mayer et al. (2000) provide a broad, general interpretation of the ability of perceiving emotions, the tasks that are used are very specific. They define the ability of perceiving emotions from both the expresser and the observer standpoint, yet, the measurement is limited to the assessment of the observer point of view. Furthermore, the ability of perceiving emotions is measured via a restricted number of still faces while also other modalities (i.e., voice and body) are considered to be essential in emotion recognition ability (e.g., Elfenbein, Beaupré, Lévesque, & Hess, 2007). Recent promising advancements in adult research have been made in this area with the Geneva Emotion Recognition Test, that includes all modalities and works with

dynamic displays (GERT; Schlegel, Grandjean, & Scherer, 2014). Moreover, the fairness and measurement equivalence of the specific stimuli for subgroups could be examined (i.e., age: children and adolescents versus adults; gender: male versus female; ethnicity: the same ethnicity of the respondent versus other ethnicities).

GENERAL CONCLUSION

To summarize, this dissertation contributes to the field of ability emotional intelligence by addressing the lack of research on maximum performance measures that are thought to be appropriate for use in children and adolescents. This dissertation focused on the test validation and the test adaptation of two state-of-the-art maximum performance measures, namely the LEAS-C and the MSCEIT-YV. We found that the original LEAS-C lacks important validity evidence because no relationship could be found with age. Moreover, we demonstrated that the validity of the LEAS-C was improved by adapting the instructions and the scoring system on the basis of the componential emotion theory and these adaptations enabled us to reveal the theoretically expected relationships with age. Furthermore, we demonstrated that the emotion domain is organized in a comparable way for children and adolescents on the one hand and adults on the other hand, justifying the use of adult criteria to score children and adolescent items and providing a solid base for item development. Finally, we demonstrated for the MSCEIT-YV that the raw responses of rating-based ability emotional intelligence tests can be used to identify emotional intelligence without using current scoring procedures. The various studies that were performed in this dissertation contributed to central themes in the emotional intelligence literature, and thereby set the stage for further research on emotional intelligence in various domains.

REFERENCES

- Bajgar, J., Ciarrochi, J., Lane, R. D., & Deane, F. (2005) Development of the Levels of Emotional Awareness Scale for Children (LEAS-C). *British Journal of Developmental Psychology*, 23, 569-586. doi:10.1348/026151005X35417
- Ciarrochi, J., Scott, G., Deane, F. P., & Heaven, P. C. L. (2003). Relations between social and emotional competence and mental health: A construct validation study. *Personality and Individual Differences*, 35, 1947-1963. doi:10.1016/S0191-8869(03)00043-6
- De Fruyt, F., Bartels, M., Van Leeuwen, K. G., De Clercq, B., Decuyper, M., & Mervielde, I. (2006). Five types of personality continuity in childhood and adolescence. *Journal of Personality and Social Psychology*, 91, 538-552. doi:10.1037/0022-3514.91.3.538
- Elfenbein, H. A., Beaupré, M. G., Lévesque, M., & Hess, U. (2007). Toward a dialect theory: Cultural differences in the expression and recognition of posed facial expressions. *Emotion*, 7, 131-146. doi:10.1037/1528-3542.7.1.131
- Farrelly, D., & Austin, E. J. (2007). Ability EI as an intelligence? Associations of the MSCEIT with performance on emotion processing and social tasks and with cognitive ability. *Cognition and Emotion*, 21, 1043-1063. doi:10.1080/02699930601069404
- Fiori, M., & Antonakis, J. (2012). Selective attention to emotional stimuli: What IQ and openness do, and emotional intelligence does not. *Intelligence*, 40, 245-254. doi:10.1016/j.intell.2012.02.004
- Flavell, J. H. (1963). *The developmental psychology of Jean Piaget*. London: D. Van Nostrand Company.
- Fontaine, J., Scherer, K. R., & Soriano, C (Eds.) (2013). *Components of Emotional Meaning: A Sourcebook*. Oxford: Oxford University Press.
- Graziano, W. G., & Eisenberg, N. (1997). Agreeableness; A dimension of personality. In R. Hogan, S. Briggs, & J. Johnson (1997). *Handbook of personality psychology*. San Diego, CA: Academic Press.
- John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John

- (Eds.), *Handbook of personality: Theory and research* (pp. 102-138). New York: Guilford Press.
- Kelly, G. A. (1955). *The psychology of personal constructs*. New York: Norton.
- Lane, R. D., Sechrest, L., Riedel, R., Weldon, V., Kaszniak, A., & Schwartz, G. E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. *Psychosomatic Medicine*, 58, 203–210.
- Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *American Journal of Psychiatry*, 144, 133-143. doi:10.1176/ajp.144.2.133
- MacCann, C., Fogarty, G. J., Zeidner, M., & Roberts R. D. (2011). Coping mediates the relationship between Emotional Intelligence (EI) and academic achievement. *Contemporary Educational Psychology*, 36, 60-70. doi:10.1016/j.cedpsych.2010.11.002
- MacCann, C., Wang, L., Matthews, G., & Roberts, R. D. (2010). Emotional intelligence and the eye of the beholder: Comparing self- and parent-rated situational judgments in adolescents. *Journal of Research in Personality*, 44, 673-676. doi:10.1016/j.jrp.2010.08.009
- Marchetti, A., Valle, A., Massaro, D., & Castelli, I. (2010). Emotional awareness in school-aged children: A contribution to the Italian validation of the LEAS-C. *Ricerche di Psicologia*, 4, 555-574. doi:10.4236/health.2013.53050
- Maul, A. (2012a). The validity of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) as a measure of emotional intelligence. *Emotion Review*, 4, 394-402. doi:10.1177/1754073912445811
- Maul, A. (2012b). Higher standards of validity evidence are needed in the measurement of emotional intelligence. *Emotion Review*, 4, 411-412. doi:10.1177/1754073912446357
- Mayer, J. D., Caruso, D. R., & Salovey, P. (2000). Emotional intelligence meets traditional standards for an intelligence. *Intelligence*, 27, 267-298. doi:10.1016/S0160-2896(99)00016-1
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2008). Emotional intelligence: new ability or eclectic traits? *American Psychologist*, 63, 503-517. doi:10.1037/0003-055x.63.6.503
- Mulligan, K., & Scherer, K. R. (2012). Toward a working definition of emotion. *Emotion Review*, 4, 345-357. doi:10.1177/1754073912445818

- O'Connor, R. M., & Little, I. S. (2003). Revisiting the predictive validity of emotional intelligence: Self-report versus ability-based measures. *Personality and Individual Differences*, 35, 1893-1902. doi:10.1016/S0191-8869(03)00038-2
- Papadogiannis, P. K., Logan, D., & Sitarenios, G. (2009). An ability model of emotional intelligence: A rationale, description, and application of the Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT). In C. Stough, D. H. Saklofske, & J. D. A. Parker (Eds), *Assessing emotional intelligence: Theory, research, and applications* (pp. 43-65). New York, NY: Springer.
- Roberts, R. D., Schulze, R., O'Brien, K., MacCann, C., Reid, J., & Maul, A. (2006). Exploring the validity of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) with established emotions measures. *Emotion*, 6, 663-669. doi:10.1037/1528-3542.6.4.663
- Russell, J. A. (1979). Affective space is bipolar. *Journal of Personality and Social Psychology*, 37, 345-356. doi:10.1037/0022-3514.37.3.345
- Russell, J. A., & Carroll, J. M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin*, 125, 3-30. doi:10.1037/0033-2909.125.1.3
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44, 693-727. doi:10.1177/0539018405058216
- Schlegel, K., Grandjean, D., & Scherer, K. R. (2014). Introducing the Geneva Emotion Recognition Test: An example of Rasch-based test development. *Psychological Assessment*, 26, 666-672. doi:10.1037/a0035246
- Van Rooy, D. L., Viswesvaran, C., & Pluta, P. (2005). A meta-analytic evaluation of construct validity: What is this thing called emotional intelligence? *Human Performance*, 18, 445-462. doi:10.1207/s15327043hup1804_9
- Veirman, E., Brouwers, S. A., & Fontaine, J. R. J. (2011). The assessment of emotional awareness in children. Validation of the Levels of Emotional Awareness Scale for Children. *European Journal of Psychological Assessment*, 27, 265-273. doi:10.1027/1015-5759/a000073
- Waller, E., & Scheidt, C. E. (2004). Somatoform disorders as disorders of affect regulation. A study comparing the TAS-20 with non-self-report measures of alexithymia. *Journal of Psychosomatic Research*, 57, 239-247. doi:10.1016/S0022-3999(03)00613-5

- Warwick, J., & Nettelbeck, T. (2004). Emotional intelligence is ...? *Personality and Individual Differences*, 37, 1091-1100. doi:10.1016/0191-8869(94)90212-7
- Werner, H., & Kaplan, B. (1963). *Symbol formation: An organismic developmental approach to language and the expression of thought*. NY: John Wiley.
- Wilhelm, O. (2005). Measures of emotional intelligence: practice and standards. In R. Schulze, & R. D. Roberts (Eds.), *International handbook of emotional intelligence* (pp. 131-154). Seattle, WA: Hogrefe & Huber.
- Wols, A., Scholte, R. H. J., & Qualter, P. (2015). Prospective associations between loneliness and emotional intelligence. *Journal of Adolescence*, 39, 40-48. doi:10.1016/j.adolescence.2014.12.007
- Zhang, W., Zou, H., Wang, M., & Sima Finy, M. (2015). The role of the Dark Triad traits and two constructs of emotional intelligence on loneliness in adolescents. *Personality and Individual Differences*, 75, 74-79. doi: 10.1016/j.paid.2014.10.025
- Zysberg, L. (2012). Loneliness and emotional intelligence. *The Journal of Psychology*, 146, 37-46. doi:10.1080/00223980.2011.574746

NEDERLANDSE SAMENVATTING

Inleiding

De voorbije twee decennia kreeg emotionele intelligentie bijzonder veel aandacht zowel vanuit de populaire (e.g., Goleman, 1995) als de wetenschappelijke psychologie (e.g., Salovey & Mayer, 1990). Emotionele intelligentie wordt beschouwd als een belangrijke aanvulling op de traditionele benadering van intelligentie en wordt beweerd te bestaan uit een aantal emotionele vaardigheden waarbij het redeneren over emoties en het gebruiken van emoties om het redeneren te ondersteunen centraal staan (Mayer, Roberts, & Barsade, 2008). Omdat er wordt van uitgegaan dat deze emotionele vaardigheden bijdragen tot het succesvol zijn in het leven (Matthews, Zeidner, & Roberts, 2007) wordt emotionele intelligentie als een belangrijke predictor voor diverse uitkomsten in onderwijsomgevingen (e.g., leren; Barchard, 2003), de werkplaats (e.g., selectie van werknemers, gedrag van werknemers en werkgevers; Côté & Miners, 2006) en klinische contexten (e.g., behandeling; Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009; Nelis et al., 2011) gezien, wat onmiddellijk ook het belang ervan voor de maatschappij onderschrijft. Het onderzoeksveld naar emotionele intelligentie wordt echter gekenmerkt door grote verdeeldheid over hoe het concept theoretisch moet worden gedefinieerd en empirisch moet worden gemeten (e.g., Mayer et al., 2008).

Hoewel er doorheen de 20^e eeuw sporadisch gebruik werd gemaakt van het woord emotionele intelligentie in de literatuur (e.g., Leuner, 1966; Payne, 1986; Van Ghent, 1953), en onderzoekers geleidelijk aan evolueerden van een strikte scheiding tussen onderzoek naar intelligentie en onderzoek naar emotie tot een geïntegreerd onderzoeksdomein van cognitie en emotie (e.g., Mayer, 2001), werd emotionele intelligentie pas in 1990 voor het eerst in de wetenschappelijke literatuur geïntroduceerd. Salovey en Mayer (1990, p. 189) defineerden emotionele intelligentie als “de vaardigheid om de eigen gevoelens en emoties en deze van anderen te monitoren en te onderscheiden, en deze informatie te gebruiken om het eigen denken en de eigen acties te sturen”. Drie jaar later benadrukten Mayer en Salovey de nood aan verder onderzoek naar

emotionele intelligentie en claimden ze dat emotionele intelligentie kan worden gezien als een vorm van klassieke intelligentie (Mayer & Salovey, 1993). In 1995 zorgde het boek "Emotional Intelligence: Why It Can Matter More Than IQ" van Daniel Goleman voor de popularisatie van emotionele intelligentie bij het brede publiek (Goleman, 1995). Hij definieerde emotionele intelligentie als "de capaciteit om de eigen gevoelens en deze van anderen te herkennen, om onszelf te motiveren, en om emoties in onszelf en onze relaties te reguleren," en zag deze vaardigheden als "vaardigheden die te onderscheiden zijn van, maar complementair zijn met, academische intelligentie, de pure cognitieve capaciteiten zoals gemeten door IQ" (Goleman, 1998, p. 317). Sindsdien nam het aantal gepubliceerde wetenschappelijke artikelen exponentieel toe, vonden er vele verfijningen van het concept emotionele intelligentie plaats en werden diverse nieuwe instrumenten ontwikkeld om emotionele intelligentie te meten.

De theoretische benaderingen van emotionele intelligentie kunnen grofweg worden opgedeeld in twee grote stromingen: de *gemengde* modellen en de *vaardigheidsmodellen* van emotionele intelligentie. De *gemengde* modellen gaan er van uit dat emotionele intelligentie bestaat uit een combinatie van persoonlijkheidstrekken en niet-cognitieve vermogens en competenties (Mayer, Salovey, & Caruso, 2000). Zo definieerde Bar-On (1997, p. 16) emotionele intelligentie als "een reeks van niet-cognitieve vermogens, competenties en vaardigheden die iemands kans van slagen en het omgaan met eisen en druk uit de omgeving beïnvloeden". Deze brede definitie omvat dus een combinatie van dispositionele, motivationele, en situationele aspecten (MacCann, Matthews, Zeidner & Roberts, 2003). De *vaardigheidsmodellen* daarentegen beschouwen emotionele intelligentie als een type van klassieke intelligentie dat zich richt op de cognitieve verwerking van emotionele informatie (Mayer et al., 2000). Volgens de definitie van Mayer et al. (2000, p. 396) is emotionele intelligentie "de vaardigheid om emoties waar te nemen en uit te drukken, emoties te gebruiken in denkprocessen, emoties te begrijpen en te redeneren met emoties, en emoties in zichzelf en anderen te reguleren. De *vaardigheidsmodellen* worden opgedeeld in twee types: de specifieke *vaardigheidsmodellen* en de integratieve *vaardigheidsmodellen*. De specifieke *vaardigheidsmodellen* focussen op individuele mentale vaardigheden die van belang zijn voor emotionele intelligentie, de integratieve *vaardigheidsmodellen* daarentegen stellen een

integratie van deze vaardigheden voor in een omvattend, overkoepelend model (Mayer et al., 2008).

De meetmethoden kunnen volgens Petrides en Furnham (2000a, 2000b, 2001, 2003, 2006) in een alternatieve opdeling - deels overlappend met de beschreven conceptuele opdeling tussen de *gemengde* modellen en de *vaardigheidsmodellen* (Mayer et al., 2000) - worden geplaatst die rekening houdt met het fundamenteel onderscheid tussen typische en maximale performantie (e.g., Ackerman & Heggestad, 1997; Cronbach, 1949; Hofstee, 2001). Zij onderscheiden enerzijds emotionele intelligentie als *trek*, waarbij emotionele intelligentie wordt beschouwd als een persoonlijkheidstrekk en wordt gemeten met zelfrapportage vragenlijsten, en anderzijds emotionele intelligentie als *vaardigheid*, waarbij emotionele intelligentie wordt beschouwd als een cognitieve vaardigheid en wordt gemeten met maximale prestatietesten. De zelfrapportage vragenlijsten zijn ontwikkeld om de percepties en opvattingen van mensen over hun competenties in bepaalde domeinen van emotionele intelligentie in kaart te brengen (Salovey, Woolery, & Mayer, 2000). In dit type van metingen wordt gevraagd aan te geven in welke mate men akkoord of niet akkoord gaat met een reeks beschrijvingen over het eigen niveau van emotionele intelligentie en vaak ook van een aantal emotie-gerelateerde disposities (e.g., Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006; Pérez, Petrides, & Furnham, 2005; Schutte et al., 1998; Wong & Law, 2002). Deze meetinstrumenten zijn vooral ontwikkeld vanuit de *gemengde* modellen (e.g., Bar-On, 1997), hoewel er ook ontwikkeld zijn vanuit de *vaardigheidsmodellen* (e.g., Schutte et al., 1998). Maximale prestatietesten zijn ontwikkeld om emotionele vaardigheden van mensen in kaart te brengen (e.g., Mayer et al., 2008). In dit type van metingen wordt gevraagd het meest adequate antwoord te selecteren voor een reeks items die emotie-gebaseerde probleemoplossing vereisen. De verkregen antwoorden worden vervolgens geëvalueerd volgens voorafbepaalde scoringscriteria (Roberts, Zeidner, & Matthews, 2001). Deze meetinstrumenten zijn allen gebaseerd op *vaardigheidsmodellen* (e.g., Mayer, Salovey, & Caruso, 2002).

Dit doctoraat conceptualiseert emotionele intelligentie volgens de *vaardigheidsmodellen* en gaat er van uit dat enkel maximale prestatietesten geschikt zijn voor het in kaart brengen van emotionele vaardigheden omwille van semantische, theoretische, en empirische redenen. Semantisch gezien typeert

de indicator *emotionele* het zelfstandig naamwoord *intelligentie* (Carroll, 1993). Het zelfstandig naamwoord *intelligentie* duidt op een construct dat een cognitieve vaardigheid of een geheel van cognitieve vaardigheden omvat (Rivers, Brackett, Salovey, & Mayer, 2007). Daarnaast is een sterkere top-down evaluatie mogelijk van theorieën die emotionele intelligentie conceptualiseren als een vaardigheid of een geheel van vaardigheden in vergelijking met de meer inductieve conceptualisaties van emotionele intelligentie als een persoonlijkheidstrek. Tot slot is het de empirische evidentie die verkregen is met maximale prestatietesten en niet de empirische evidentie die verkregen is met zelfrapportage vragenlijsten die emotionele intelligentie als een vaardigheid of een geheel van vaardigheden ondersteund en is de empirische evidentie met zelfrapportage vragenlijsten voor conceptualisaties van emotionele intelligentie als een persoonlijkheidstrek eerder heterogeen en meer inconsistent (e.g., Mayer, et al., 2008).

Onderzoek naar emotionele intelligentie vanuit de *vaardigheidsmodellen* met maximale prestatietesten blijkt tot hiertoe voornamelijk uitgevoerd te zijn bij volwassenen. Pas recentelijk zijn een aantal testen ontwikkeld voor gebruik bij kinderen en adolescenten. Deze testen zijn gebaseerd op de eerder ontwikkelde testen voor gebruik bij volwassenen, hoewel het niet duidelijk is of deze testen eenzelfde betekenis hebben voor kinderen en adolescenten en op een gelijkaardige manier functioneren bij kinderen en adolescenten. Als we de aard van emotionele intelligentie meer omvattend willen begrijpen is het dus noodzakijk om ook te focussen op een valide meting van emotionele intelligentie bij kinderen en adolescenten. Daarom richt dit doctoraat zich op de twee belangrijkste beschikbare testen voor kinderen en adolescenten, namelijk de Levels of Emotional Awareness Scale for Children (LEAS-C) en de Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV).

De vier onderzoeksvragen die in dit doctoraat centraal staan richten zich op de testvalidatie en de testadaptatie van deze testen: (1) de validiteit van de originele LEAS-C bij kinderen en adolescenten, (2) de validiteit van een aangepaste versie van de LEAS-C bij kinderen en adolescenten, (3) de cognitieve representatie van het emotiedomein bij kinderen, adolescenten, studenten, en volwassenen, en (4) de validiteit van de originele MSCEIT-YV en een aangepaste en uitgebreide versie van de MSCEIT-YV bij kinderen en

adolescenten. De vier onderzoeksvragen lopen parallel met de vier hoofdstukken die zes empirische studies beschrijven.

In het volgende gedeelte wordt het onderzoeksproject geschetst. In een eerste deel wordt de LEAS-C beschreven en worden vervolgens (1) de onderzoeksvragen kort gekaderd binnen de bestaande literatuur, (2) de daaraan gekoppelde doelstellingen van de uitgevoerde studies beschreven, en (3) de belangrijkste bevindingen van deze studies en de daaruit volgende conclusies besproken. In een tweede deel wordt dezelfde benadering gevolgd voor de MSCEIT-YV. We sluiten tenslotte af met een korte algemene conclusie van het doctoraat.

Huidig onderzoeksproject

Levels of Emotional Awareness Scale for Children

De Levels of Emotional Awareness Scale for Children (LEAS-C; Bajgar, Ciarrochi, Lane, & Deane, 2005) is de kindversie van de Levels of Emotional Awareness Scale (LEAS; Lane, Quinlan, Schwartz, & Walker, 1990). Deze test meet één aspect van emotionele intelligentie, namelijk emotioneel inzicht, en gaat er van uit dat emotioneel inzicht een cognitieve vaardigheid is die ontwikkelt met leeftijd. Het instrument bekleedt een unieke positie tussen zelfrapportage vragenlijsten en maximale prestatietesten. Er wordt niet aan kinderen gevraagd om hun eigen niveau van emotioneel inzicht in te schatten zoals het geval is bij zelfrapportage vragenlijsten, en hun antwoorden worden ook niet gescoord op correctheid wat het geval is bij maximale prestatietesten. Ze worden gevraagd om te beschrijven hoe ze zichzelf zouden voelen (zelf-perspectief) en hoe een andere persoon zich zou voelen (ander-perspectief) in verschillende aangeboden scenario's om zo de dispositionele manier van hoe men omgaat met emotionele informatie uit te lokken.

Hoewel er verschillen zijn tussen de LEAS-C en de LEAS voor de scenario's (12 scenario's bij de LEAS-C en 20 scenario's bij de LEAS), zijn het theoretisch kader en de scoringsprocedure van beide testen identiek. In overeenstemming met het Levels of Emotional Awareness (LEA) model worden er drie scores toegekend, namelijk een zelfscore, een anderscore, en een totaalscore (e.g., Lane & Schwartz, 1987; Lane et al., 1990). Deze scores worden verondersteld het niveau van complexiteit in de beschrijvingen voor elk

scenario weer te geven. Op Niveau 0 worden cognities gescoord (e.g., Ik zou denken dat het al van in het begin geen goed idee was). Op Niveau 1 worden lichamelijke gewaarwordingen (e.g., Ik zou me misselijk voelen) of een gebrek aan een emotionele respons (e.g., Ik zou helemaal niets voelen) geplaatst. Op Niveau 2 worden acties (e.g., Ik zou me voelen alsof ik mij niet kan bewegen) of algemene emotionele toestanden (e.g., Ik zou me goed voelen) gescoord. Op Niveau 3 worden enkelvoudige emoties geplaatst (e.g., Ik zou me jaloers voelen). Op Niveau 4 worden combinaties van emoties gescoord (e.g., Ik zou me blij en verliefd voelen). Tot slot, worden combinaties van emoties die voor het zelf en de ander gedifferentieerd zijn op Niveau 5 gescoord (e.g., Ik zou me beschaamd en bang voelen en mijn vriend zou zich kwaad en verdrietig voelen). De zelf- en anderscores zijn gebaseerd op het hoogst behaalde niveau in het antwoord op een scenario en kunnen dus variëren van 0 tot 4. De totaalscore is gebaseerd op de hoogste score voor zelf en ander, tenzij er voor zelf en ander een score 4 wordt gegeven en er differentiatie is tussen de emotietermen voor het zelf- en het ander-perspectief.

Onderzoeksvraag 1: Is de originele LEAS-C een valide maat om emotioneel inzicht te meten?

De validiteitsevidentie voor de LEAS-C was bij de aanvang van dit doctoraat beperkt tot slechts één gepubliceerde wetenschappelijke studie (Bajgar et al., 2005). Deze studie beschreef de constructie en de initiële validatie van de LEAS-C in een kleine steekproef ($N = 51$) met een beperkt leeftijdsbereik (10- en 11-jarigen). Er werden geen analyses op de interne structuur uitgevoerd, het netwerk van convergente en discriminante relaties was beperkt tot slechts een aantal correlaten, en de kernassumptie van het LEA model dat emotioneel inzicht ontwikkelt met stijgende leeftijd werd getest met behulp van normatieve data bij volwassenen met de LEAS (Lane et al., 1996) en niet ondersteund.

De eerste empirische studie die in hoofdstuk 2 van dit doctoraat wordt beschreven had daarom tot doelstelling om de bestaande preliminaire validiteitsevidentie uit te breiden en leeftijdsverschillen in emotioneel inzicht te testen in een substantieel grotere steekproef ($N = 318$) met een veel breder leeftijdsbereik (10- tot 17-jarigen).

Uit de resultaten bleek dat de betrouwbaarheid aanvaardbaar was voor zelf-, ander-, en totaalscores, gelijkend aan de resultaten betreffende de interne consistentie die werden gerapporteerd in de studie van Bajgar et al. (2005). De resultaten van de interne structuur analyses toonden goede tot aanvaardbare fitmaten voor een één-factor model voor de totaalscores en een twee-factor model voor zelf- en anderscores samen waarbij de zelf- en anderfactoren hoog gecorreleerd bleken. Beiden ondersteunen het gebruik van de totaalscore voor de meting van emotioneel inzicht die het meest frequent wordt gehanteerd. Met betrekking tot het netwerk van convergente en discriminante relaties toonden de resultaten aan dat het patroon van correlaties voor de totaalscores met intelligentie, persoonlijkheid, alexithymie, emotionele intelligentie, en sociale en emotionele beperkingen in overeenstemming was met het theoretisch kader van de LEAS-C en eerdere onderzoeksbevindingen met de LEAS-C (Bajgar et al., 2005) en de LEAS (e.g., Ciarrochi, Scott, Deane, & Heaven, 2003; Lane et al., 1996; Waller & Scheidt, 2004). We vonden verder dat meisjes gemiddeld gezien hoger scoorden dan jongens voor zelf-, ander-, en totaalscores en bevestigen zo eerder gerapporteerde geslachtsverschillen (Bajgar et al., 2005). Er werden echter in tegenstelling tot onze verwachtingen geen leeftijdsverschillen gevonden voor zelf-, ander-, en totaalscores.

De resultaten van dit eerste onderzoek laten geen duidelijk antwoord toe op de eerste onderzoeksvraag naar de validiteit van de LEAS-C. Het feit dat in deze studie met een substantieel grotere steekproef en een breder leeftijdsbereik geen leeftijdsverschillen werden gevonden is problematisch voor de validiteit van de LEAS-C. Het LEA model voorspelt immers een toename van emotioneel inzicht in de kindertijd en de adolescentie. Niettegenstaande vonden we dat de interne structuur, het netwerk van convergente en discriminante relaties, en de geslachtsverschillen volgens de verwachtingen waren en duiden op de potentiële waarde van de LEAS-C.

Onderzoeksvraag 2: Kan de validiteit van de originele LEAS-C worden verbeterd door de instructies en de scoringsprocedure aan te passen op basis van de componentiële emotiebenadering?

De LEAS-C is gebaseerd op een cognitieve ontwikkelingstheorie en is niet ingebed in een sterk theoretisch kader over emoties. De instructies en de

scoringsprocedure zijn voornamelijk gefocust op gevoelens. Binnen de huidige emotiepsychologie is het echter algemeen aanvaard dat een emotie bestaat uit verschillende emotiecomponenten (i.e., inschattingen, actietendenzen, lichamelijke reacties, expressies, en gevoelens) (Scherer, 2005). Omdat het woord *voelen* in het dagelijks leven op vele verschillende manieren kan worden geïnterpreteerd kunnen de instructies geleid hebben tot ongewilde variatie in antwoorden (Mulligan & Scherer, 2012). Daarnaast is de scoringsprocedure ook niet in staat om de complexiteit van een emotionele ervaring in een beschrijving te vatten in termen van emotiecomponenten omdat het enkel het hoogst behaalde niveau van emotioneel inzicht in rekening brengt voor elk perspectief binnen elk scenario, ongeacht of een beschrijving nog informatie bevat over andere niveaus.

De tweede empirische studie die in hoofdstuk 3 van dit doctoraat wordt beschreven had daarom tot doelstelling om de validiteit van de LEAS-C te verbeteren door de instructies en de scoringsprocedure aan te passen in overeenstemming met de componentiële emotiebenadering. De instructies werden gewijzigd van *voelen* naar *ervaren*, en de aandacht van de deelnemers werd gevestigd op alle emotiecomponenten. Verder werd een nieuwe componentiële scoringsprocedure ontwikkeld die de verschillende in de beschrijvingen gerepresenteerde componenten in rekening bracht. Er werd in deze studie eveneens aandacht besteed aan de assumptie dat emotioneel inzicht ontwikkeld. De aangepaste LEAS-C betrof een verkorte versie van zes scenario's om effecten van vermoeidheid en overbevraging te voorkomen en werd afgenomen van een aanzienlijk grote steekproef ($N = 574$) met een breed leeftijdsbereik (8- tot 16-jarigen). De data werden gescoord in overeenstemming met de originele scoringsprocedure en de componentiële scoringsprocedure.

De resultaten toonden aan dat zelf, ander, en totaalscores voor de aangepaste LEAS-C betrouwbaar waren, wat aansluit bij de bevindingen van studies die tot op heden zijn uitgevoerd met de originele LEAS-C (Bajgar et al., 2005; Marchetti et al., 2010; Veirman et al., 2011). Er werden gelijkaardige betrouwbaarheden gevonden voor de originele scoringsprocedure en substantieel hogere betrouwbaarheden voor de componentiële scoringsprocedure. De componentiële scoringsprocedure vertoonde daarenboven een hoge interbeoordelaarsbetrouwbaarheid voor zelf, ander, en

totaalscores. De resultaten van de interne structuur analyses toonden goede fitmaten voor een één-factor model voor de totaalscores voor beide scoringsprocedures. Voor zelf- en anderscores werd de beste fit gevonden voor een één-factor model voor de componentieel gescoorde data. Deze bevinding spreekt de bevinding van het twee-factor model voor zelf- en anderscores uit Hoofdstuk 1 tegen. Waarschijnlijk heeft de aanpassing van de instructies ervoor gezorgd dat de beperkte verschillen tussen zelf en ander nu helemaal verdwijnen. Met betrekking tot het netwerk van convergente en discriminante relaties toonden de resultaten voor beide scoringsprocedures aan dat het patroon van correlaties voor de totaalscores met intelligentie, persoonlijkheid, alexithymie, emotionele intelligentie, en sociale en emotionele beperkingen in overeenstemming was met het theoretisch kader van de LEAS-C en eerdere onderzoeksbevindingen van de LEAS-C (Bajgar et al., 2005; Marchetti et al., 2010; Veirman et al., 2011). We vonden eveneens dat meisjes gemiddeld gezien hoger scoorden dan jongens voor zelf-, ander-, en totaalscores en ondersteunen zo eerder gerapporteerde geslachtsverschillen met de originele LEAS-C (Bajgar et al., 2005; Marchetti et al., 2010; Veirman et al., 2011). Met de aangepaste versie werden zoals theoretisch verwacht leeftijdsverschillen voor zelf-, ander-, en totaalscores gevonden voor beide scoringsprocedures. Deze verschillen waren het meest uitgesproken voor de componentiële scoring.

Het antwoord op de tweede onderzoeksvraag is dus duidelijk positief. De aanpassingen van de instructies en de scoringsprocedure in overeenstemming met een componentiële benadering op emoties resulteerden niet alleen een duidelijke interne structuur, het verwachte patroon van correlaties binnen het netwerk van convergente en discriminante relaties, en geslachtsverschillen in het voordeel van meisjes. Meer nog, in deze studie met een grote steekproef en een breed leeftijdsbereik zijn nu ook leeftijdsverschillen gevonden, waardoor voor het eerst in de literatuur volledige ondersteuning wordt gevonden voor Lane en Schwartz's (1987) claim dat emotioneel inzicht ontwikkelt met leeftijd.

Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version

De Mayer-Salovey-Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV; Mayer, Salovey, Caruso, 2015) is de kindversie van de Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT, Mayer, Salovey, Caruso, 2002), de

meest gebruikte omnibus test van het viertakkenmodel van emotionele intelligentie. Hoewel het achterliggend kader voor beide testen identiek is, zijn de taken en de scoringsprocedure verschillend. De MSCEIT heeft twee taken per tak, terwijl de MSCEIT-YV slechts één taak per tak heeft. De vaardigheid van het waarnemen van emoties (32 items) wordt gemeten via acht gezichten. Voor elk gezicht moeten kinderen aangeven in welke mate verschillende emoties aanwezig zijn in het gezicht. De vaardigheid van het gebruiken van emoties om het denken te faciliteren (24 items) is gemeten via zes synesthesie taken. Voor elke taak dienen kinderen aan te geven in welke mate een emotie voelt als vier verschillende sensaties of in welke mate een combinatie van sensaties voelt als vier verschillende emoties. De vaardigheid van het begrijpen van emoties (23 items) is gemeten via een reeks meerkeuzevragen over emotiedefinities (i.e., het combineren van correcte emotietermen met beschrijvingen van gevoelens), emotietransities en veranderingen (i.e., het detecteren van emoties die ontstaan uit specifieke beschrijvingen van gebeurtenissen), en combinaties van emoties (i.e., het selecteren van een combinatie van emoties die corresponderen met beschrijvingen van emotionele toestanden). Kinderen moeten het best passende antwoord selecteren uit vier of vijf opties. De vaardigheid van het monitoren van emoties wordt gemeten door zes verhalen (18 items). Voor elk verhaal dienen kinderen aan te geven in welke mate drie acties effectief zouden zijn om een bepaalde emotionele toestand te realiseren. Terwijl de MSCEIT is voorzien van een expert scoringsprocedure en een consensus scoringsprocedure is de scoringsprocedure die wordt gebruikt om de antwoorden op de MSCEIT-YV te scoren gebaseerd is op volwassen criteria die theoretische criteria, onderzoeksbevindingen, en beoordelingen van experts combineren. In de initiële normatieve steekproef kozen de kinderen en adolescenten voor een groot deel van de items niet het beste antwoord, vandaar dat consensus scoring als een niet geschikte procedure werd bevonden (Papadogiannis, Logan, & Sitarenios, 2009). De scoring van MSCEIT-YV resulteert in vier takscores en een globale emotionele intelligentiescore.

Onderzoeksvraag 3: Representeren kinderen en adolescenten emoties op eenzelfde manier als studenten en volwassenen?

Het kan in vraag gesteld worden of de hoofdzakelijk volwassen criteria waarvan de MSCEIT-YV scoringsprocedure gebruikt maakt, geschikt zijn om de correctheid van antwoorden op emotionele vragen te evalueren bij kinderen en adolescenten.

De derde en vierde empirische studie die in hoofdstuk 4 van dit doctoraat worden beschreven hadden daarom tot doelstelling om de vergelijkbaarheid van de cognitieve representatie van het emotiedomein voor kinderen, adolescenten, studenten, en volwassenen na te gaan. Deze studies focusten op emotiewoorden omdat het is aangetoond dat emotiewoorden informatie bevatten over alle emotiecomponenten (Fontaine, Scherer, Soriano, 2013) en emotiewoorden ook deel uitmaken van nagenoeg elk MSCEIT-YV item.

De derde empirische studie was gefocust op het emotielexicon en werd uitgevoerd in een grote steekproef kinderen en adolescenten ($N = 5071$). Deze studie resulteerde in de identificatie van een representatieve set van spontaan gerapporteerde emotietermen die sterk gelijken op emotietermen die volwassenen gebruiken (Fontaine, Scherer, & Soriano, 2013). De resultaten toonden aan dat meisjes in het algemeen meer emotietermen rapporteerden, dat er meer emotietermen werden gerapporteerd met stijgende leeftijd, en dat het leeftijdseffect meer uitgesproken was bij meisjes. Deze resultaten vormen een belangrijke bijdrage aan de emotieliteratuur omdat deze studie de eerste studie is die via spontane rapportage en op deze schaal het emotielexicon onderzocht. Deze resultaten suggereren dat geslachts- en leeftijdsverschillen kunnen worden verwacht in testen die voornamelijk gebruik maken van emotietermen.

De vierde empirische studie was gefocust op de dimensionele structuur van emoties en werd uitgevoerd in een grote steekproef kinderen, adolescenten, studenten, en volwassenen ($N = 1184$). Voor deze studie werd een similariteitsbeoordelingstaak ontwikkeld, gebaseerd op de ideeën van het GRID onderzoek waarin de betekenis van emoties werd onderzocht op basis van de componentiële emotiebenadering (Fontaine, Scherer, & Soriano, 2013). In het bijzonder werd aan participanten gevraagd om aan te geven in welke mate ze akkoord waren dat de emotietermen van een set van woordparen gelijkend waren. De resultaten toonden aan dat de paarsgewijze vergelijkingen meer betrouwbaar waren voor studenten en volwassenen dan voor kinderen en adolescenten. Niettegenstaande konden de gemiddelde

similariteitsbeoordelingen voor iedereen adequaat worden gerepresenteerd in eenzelfde vierdimensionale ruimte (valentie, dominantie, arousal, en nieuwheid). Met stijgende leeftijd representeerden kinderen en adolescenten de emotietermen meer accuraat langs deze vier dimensies. Naast het leeftijdseffect voor de betrouwbaarheid van de similariteitsbeoordelingen, werd ook een leeftijdseffect gevonden voor de saillantie van de dimensies tussen enerzijds de kinderen en adolescenten, en anderzijds de studenten en volwassenen. Binnen de steekproef kinderen en adolescenten werd eveneens een leeftijdseffect aangetoond. We observeerden dat de valentie dimensie relatief gezien saillant werd met stijgende leeftijd, terwijl dominantie, arousal, en nieuwheid relatief gezien minder saillant werden met stijgende leeftijd. Dit kan betekenen dat kinderen en adolescenten beter begrijpen hoe verschillende emotieprocessen op elkaar gelijkend in functie van hun hedonische toon naarmate ze ouder worden. Deze resultaten leveren een belangrijke bijdrage aan de emotieliteratuur omdat voor het eerst een vier-dimensionale structuur van valentie, dominantie, arousal, en nieuwheid werd aangetoond bij kinderen, adolescenten, studenten, en volwassenen, louter en alleen op basis van een eenvoudige similariteitsbeoordelingstaak. Verder geven deze resultaten ook aan dat volwassen criteria kunnen worden gebruikt in metingen van emotionele intelligentie omdat deze populaties het emotiedomein structureren langs dezelfde onderliggende dimensies. De resultaten van deze twee studies werden ook gebruikt voor de ontwikkeling van een nieuwe set items voor de tweede empirische studie van de MSCEIT-YV in Hoofdstuk 5. In deze items werden emotietermen vergeleken met andere emotietermen.

Het antwoord op de tweede onderzoeksvraag is dus positief. Kinderen en adolescenten rapporteren gelijkaardige emotietermen als volwassenen, en kinderen en adolescenten evalueren emotietermen volgens dezelfde dimensies van valentie, dominantie, arousal, en nieuwheid zoals studenten en volwassenen.

Onderzoeksvraag 4: Kan een scoring die rechtstreeks gebaseerd is op de ruwe antwoorden van de beoordelingstaken van de MSCEIT-YV de conceptuele, correlationele, en ontwikkelingscriteria bevestigen die worden

gebruikt om emotionele intelligentie te kunnen beschouwen als een klassieke intelligentie?

De traditionele expert en consensus scoringsprocedures van de MSCEIT-YV zijn sterk bekritiseerd door de jaren heen omdat het niet duidelijk is hoe variatie in scores gerelateerd is aan variatie in emotionele intelligentie (e.g., Maul, 2012a, 2012b; Wilhelm, 2005). De scoringsprocedure die door de MSCEIT-YV wordt gebruikt, kan zo evenzeer bekritiseerd worden. Daarom ontwikkelden we een theoretisch kader om te begrijpen hoe de ruwe antwoorden op beoordelingstaken van de MSCEIT-YV en gelijkaardige taken gestructureerd zijn en onderzochten we de waarde van dit theoretisch kader in de vijfde en zesde empirische studie van dit doctoraat. We gingen er van uit dat de antwoorden op beoordelingstaken gestructureerd worden door een bipolaire emotionele intelligentie factor waarop de items ofwel een positieve ofwel een negatieve lading vertonen. Deze hypothese was gebaseerd op Kelly's (1955) Persoonlijke construct theorie. Volgens deze theorie is het menselijke denken bipolair van aard. Verder gingen we er van uit dat instemmingstendens en meerdimensionaliteit deze theoretische verwachte bipolaire emotionele intelligentie factor zouden kunnen maskeren. Voor de instemmingstendens factor verwachtten we dat alle items positieve ladingen zouden vertonen. Meerdimensionaliteit werd exploratorisch onderzocht. Deze hypothesen werden afgeleid uit baanbrekend onderzoek naar de bipolariteit van affect (Russell, 1979; Russell & Carroll, 1999). Daarnaast verwachtten we ook dat de resultaten gekoppeld zouden kunnen worden aan de drie criteria (i.e., conceptuele, correlationele, en ontwikkelingscriteria) die Mayer et al. (2000) gebruikten om emotionele intelligentie als een legitieme intelligentie te beschouwen.

De eerste studie werd uitgevoerd in een grote steekproef kinderen en adolescenten ($N = 630$) met een breed leeftijdsbereik (10- tot 17-jarigen) en nam de beoordelingstaken van de MSCEIT-YV voor waarnemen, faciliteren, en monitoren onder de loep. Een tweede studie werd eveneens uitgevoerd in een grote steekproef kinderen en adolescenten ($N = 664$) met een breed leeftijdsbereik (8- tot 16-jarigen), nam deze zelfde testen uit de eerste studie onder de loep en keek bijkomend naar een beoordelingstaak voor begrijpen van de MSCEIT-YV en additionele taken voor waarnemen, faciliteren, en monitoren.

De resultaten op itemniveau toonden inderdaad evidentie aan voor het bestaan en de generaliseerbaarheid van een bipolaire emotionele intelligentie factor en een unipolaire instemmingstendens factor. Deze structuur werd in elke steekproef voor elke split-half en voor de volledige steekproef gevonden voor alle rating-gebaseerde testen, wat de robuustheid van de resultaten benadrukt. Multidimensionaliteit werd enkel gevonden voor waarnemen. Verder bleken de individuele emotionele intelligentiescores en instemmingstendens scores voor alle beoordelingstaken in een twee-factor model te kunnen worden geplaatst met een algemene emotionele intelligentie factor en een algemene instemmingstendens factor. De algemene emotionele intelligentie factor toonde het verwachte patroon van correlaties met intelligentie, persoonlijkheid, alexithymie, en sociale en emotionele beperkingen, geslachtverschillen in het voordeel van meisjes, en leeftijdsverschillen.

Het antwoord op de vierde onderzoeksvraag is dus positief. Validiteitsevidentie voor *vaardigheid*se emotionele intelligentie hoeft niet noodzakelijk gebaseerd te zijn op expert of consensus scoring. Er is een coherent emotionele intelligentie construct te vinden op basis van de ruwe data van beoordelingstaken. De resultaten van deze studies zijn belangrijk voor de literatuur rond emotionele intelligentie omdat ze voor het eerst aantonen dat het onderzoeken van de interne structuur op basis van ruwe data van beoordelingstaken een vruchtbaar alternatief vormt voor de traditionele scoringsprocedures. Ze tonen verder ook aan dat traditionele scoringsprocedures gevoelig zijn voor instemmingstendens en benadrukken het belang van verder onderzoek naar de validiteit van dit soort testen op basis van het aangereikte theoretisch kader.

Conclusie

Samengevat draagt dit doctoraat bij aan het onderzoeksveld van emotionele intelligentie door in te gaan op het gebrek aan onderzoek naar maximale prestatietesten bij kinderen en adolescenten. Meer specifiek was dit doctoraat gericht op twee belangrijke testen, de LEAS-C en de MSCEIT-YV. De eerste twee hoofdstukken die de LEAS-C onder de loep namen, waren gefocust op de originele LEAS-C en een aangepaste versie van de LEAS-C. We vonden in een eerste studie dat de originele LEAS-C beperkt is in zijn validiteit omdat er geen

leeftijdsverschillen werden gevonden. We toonden verder in een tweede studie aan dat de validiteit van deze originele LEAS-C verbeterd kon worden door gebruik te maken van de componentiële emotiebenadering voor het aanpassen van de instructies en de scoringsprocedure, en dat deze aanpassingen ons ook in staat stelden om de theoretisch verwachte leeftijdsverschillen te vinden. De laatste twee hoofdstukken die gericht waren op de MSCEIT-YV waren gefocust op de cognitieve representatie van het emotiedomein en op de validiteit van de MSCEIT-YV en een aangepaste en uitgebreide versie van de MSCEIT-YV. We vonden in een eerste studie dat de spontaan gerapporteerde emotietermen door kinderen en adolescenten sterk vergelijkbaar zijn met emotietermen die bij volwassenen worden gebruikt en gevonden. Daarnaast vonden we tevens dat kinderen en adolescenten op eenzelfde manier emotietermen evalueren als studenten en volwassenen. Het feit dat het emotiedomein op een gelijkaardige manier georganiseerd is, lijkt het gebruik van volwassen criteria te rechtvaardigen voor het beoordelen van de correctheid van antwoorden op emotie-gerelateerde items. Deze data vormen ook een sterke basis voor het ontwikkelen van nieuwe items. Tot slot, toonden de resultaten van een tweede studie aan dat de ruwe antwoorden van beoordelingstaken zoals deze van de MSCEIT-YV en gelijkaardige taken kunnen worden gebruikt om emotionele intelligentie in kaart te brengen zonder dat er nood is aan het toepassen van de traditionele scoringsprocedures. De verschillende studies die in dit doctoraat centraal staan, dragen dus bij aan een verbeterde assessment van emotionele intelligentie.

REFERENTIES

- Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin*, 121, 219-245. doi:10.1037//0033-2909.121.2.219
- Barchard, K. A. (2003). Does emotional intelligence assist in the prediction of academic success? *Educational and Psychological Measurement*, 63, 840-858. doi:10.1177/0013164403251333.
- Bajgar, J., Ciarrochi, J., Lane, R. D., & Deane, F. (2005) Development of the Levels of Emotional Awareness Scale for Children (LEAS-C). *British Journal of Developmental Psychology*, 23, 569-586. doi:10.1348/026151005X35417
- Bar-On, R. (1997). *The Emotional Quotient Inventory (EQ-i): Technical manual*. Toronto, Canada: Multi-Health Systems.
- Brackett, M., Rivers, S., Shiffman, S., Lerner, N., & Salovey, P. (2006). Relating emotional abilities to social functioning: A comparison of self-report and performance measures of emotional intelligence. *Journal of Personality and Social Psychology*, 91, 780-795. doi:10.1037/0022-3514.91.4.780
- Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor analytic studies*. New York: Cambridge University Press.
- Ciarrochi, J., Scott, G., Deane, F. P., & Heaven, P. C. L. (2003). Relations between social and emotional competence and mental health: A construct validation study. *Personality and Individual Differences*, 35, 1947-1963. doi:10.1016/S0191-8869(03)00043-6
- Côté, S., & Miners, C. T. H. (2006). Emotional intelligence, cognitive intelligence, and job performance. *Administrative Science Quarterly*, 51, 1-28. doi:10.2189/asqu.51.1.1
- Cronbach, L. J. (1949). *Essentials of psychological testing*. New York: Halpern.
- Goleman, D. (1995). *Emotional intelligence*. New York: Bantam Books.
- Goleman, D. (1998). *Working with emotional intelligence*. New York: Bantam Books.
- Fontaine, J., Scherer, K. R. & Soriano, C (Eds.) (2013). *Components of emotional meaning: A sourcebook*. Oxford: Oxford University Press.

- Hofstee, W. K. B. (2001). Personality and intelligence: Do they mix? In J. M. Collis & S. Messick (Eds.), *Intelligence and personality: Bridging the gap in theory and measurement*. (pp. 43-60). England: Plymouth.
- Kelly, G. A. (1955). *The psychology of personal constructs*. New York: Norton.
- Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *American Journal of Psychiatry*, 144, 133-143. doi:10.1176/ajp.144.2.133
- Lane, R. D., Sechrest, L., Riedel, R., Weldon, V., Kaszniak, A., & Schwartz, G. E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. *Psychosomatic Medicine*, 58, 203-210.
- Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The Levels of Emotional Awareness Scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment*, 55, 124-134. doi:10.1080/00223891.1990.9674052
- Leuner, B. (1966). Emotional intelligence and emancipation. *Praxis der Kinderpsychologie und Kinderpsychiatrie*, 15, 193-203.
- MacCann, C., Matthews, G., Zeidner, M., & Roberts, R. D. (2003). Psychological assessment of emotional intelligence: a review of self-report and performance-based testing. *International Journal of Organizational Analysis*, 11, 247-274. doi:10.1108/eb028975
- Marchetti, A., Valle, A., Massaro, D., & Castelli, I. (2010). Emotional awareness in school-aged children: A contribution to the Italian validation of the LEAS-C. *Ricerche di Psicologia*, 4, 555-574. doi:10.4236/health.2013.53050
- Matthews, G., Zeidner, M., & Roberts, R. D. (Eds.). (2007). *The science of emotional intelligence: Knowns and unknowns*. New York: Oxford University Press.
- Maul, A. (2012a). The validity of the Mayer-Salovey-Caruso emotional intelligence test (MSCEIT) as a measure of emotional intelligence. *Emotion Review*, 4, 394-402. doi:10.1177/1754073912445811
- Maul, A. (2012b). Higher standards of validity evidence are needed in the measurement of emotional intelligence. *Emotion Review*, 4, 411-412. doi:10.1177/1754073912446357

- Mayer, J. D. (2001). A field guide to emotional intelligence. In J. Ciarrochi, J. P. Forgas, & J. D. Mayer (Eds.), *Emotional intelligence and everyday life* (pp.3-24). New York: Psychology Press.
- Mayer, J. D., & Salovey, P. (1993). The intelligence of emotional intelligence. *Intelligence*, 17, 433-442. doi: 10.1016/0160-2896(93)90010-3
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2000). Models of emotional intelligence. In R. J. Sternberg (Ed.), *Handbook of intelligence* (pp. 396-420). New York, NY: Cambridge University Press.
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2002). *The Mayer, Salovey, and Caruso Emotional Intelligence Test: Technical manual*. Toronto: Multi-Health Systems.
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2015). *Mayer-Salovey-Caruso Emotional Intelligence Test: YRV Researcher's guide*. Toronto: Multi-Health Systems.
- Mayer, J. D., Roberts, R. D., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, 59, 507-536. doi:10.1146/annurev.psych.59.103006.093646
- Mulligan, K., & Scherer, K. R. (2012). Toward a working definition of emotion. *Emotion Review*, 4, 345-357. doi:10.1177/1754073912445818
- Nelis, D., Quoidbach, J., Mikolajczak, M., & Hansenne, M. (2009). Increasing emotional intelligence: (how) is it possible? *Personality and Individual Differences*, 47, 36-41. doi:10.1016/j.paid.2009.01.046
- Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., & Mikolajczak, M. (2011). Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. *Emotion*, 11, 354-366. doi:10.1037/a0021554
- Papadogiannis, P. K., Logan, D., & Sitarenios, G. (2009). An ability model of emotional intelligence: A rationale, description, and application of the Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT). In C. Stough, D. H. Saklofske, & J. D. A. Parker (Eds), *Assessing emotional intelligence: Theory, research, and applications* (pp. 43-65). New York, NY: Springer.
- Payne, W. L. (1986). A study of emotion: Developing emotional intelligence; Self-integration; relating to fear, pain and desire. *Dissertation Abstracts International*, 47, (01), p. 203A. (University Microfilms No. AAC 8605928).

- Pérez, J. C., Petrides, K. V., Furnham, A. (2005). Measuring trait emotional intelligence. In R. Schulze & R. D. Roberts (Eds.), *Emotional intelligence: An international handbook* (pp. 181-201). Cambridge, MA: Hogrefe & Huber.
- Petrides, K. V., & Furnham, A. (2000a). On the dimensional structure of emotional intelligence. *Personality and Individual Differences*, 29, 313-320. doi:10.1016/S0191-8869(99)00195-6
- Petrides, K. V., & Furnham, A. (2000b). Gender differences in measured and self-estimated trait emotional intelligence. *Sex Roles*, 42, 449-461. doi:10.1023/A:1007006523133
- Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality*, 15, 425-448. doi:10.1002/per.416
- Petrides, K. V., & Furnham, A. (2003). Trait emotional intelligence: Behavioural validation in two studies of emotion recognition and reactivity to mood induction. *European Journal of Personality*, 17, 39-57. doi:10.1002/per.466
- Petrides, K. V., & Furnham, A. (2006). The role of trait emotional intelligence in a gender-specific model of organizational variables. *Journal of Applied Social Psychology*, 36, 552-569. doi:10.1111/j.0021-9029.2006.00019.x
- Rivers, S. E., Brackett, M. A., Salovey, P., & Mayer, J. D. (2007). Measuring emotional intelligence as a set of mental abilities. In G. Matthews, M. Zeidner, & R. D. Roberts (Eds.), *The science of emotional intelligence: Knowns and unknowns* (pp. 230-257). New York: Oxford University Press.
- Roberts, R. D., Zeidner, M., & Matthews, G. (2001). Does emotional intelligence meet traditional standards for an intelligence? Some new data and conclusions. *Emotion*, 1, 196-231. doi:10.1037//1528-3542.1.3.196
- Russell, J. A. (1979). Affective space is bipolar. *Journal of Personality and Social Psychology*, 37, 345-356. doi:10.1037/0022-3514.37.3.345
- Russell, J. A., & Carroll, J. M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin*, 125, 3-30. doi:10.1037/0033-2909.125.1.3
- Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, 9, 185-211. doi:10.2190/DUGG-P24E-52WK-6CDG

- Salovey, P., Woolery, A., & Mayer, J. D. (2001). Emotional intelligence: conceptualization and measurement. In G. Fletcher & M. Clark (Eds.), *The Blackwell handbook of social psychology* (pp. 279-307). London: Blackwell.
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44, 693-727. doi:10.1177/0539018405058216
- Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J., Dornheim, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences*, 25, 167-177. doi:10.1016/S0191-8869(98)00001-4
- Van Ghent, D. (1953). *The English novel: Form and function*. New York, NY: Harper & Row.
- Veirman, E., Brouwers, S. A., & Fontaine, J. R. J. (2011). The assessment of emotional awareness in children. Validation of the Levels of Emotional Awareness Scale for Children. *European Journal of Psychological Assessment*, 27, 265-273. doi:10.1027/1015-5759/a000073
- Waller, E., & Scheidt, C. E. (2004). Somatoform disorders as disorders of affect regulation. A study comparing the TAS-20 with non-self-report measures of alexithymia. *Journal of Psychosomatic Research*, 57, 239-247. doi:10.1016/S0022-3999(03)00613-5
- Wilhelm, O. (2005). Measures of emotional intelligence: practice and standards. In R. Schulze, & R. D. Roberts (Eds.), *International handbook of emotional intelligence* (pp. 131-154). Seattle, WA: Hogrefe & Huber.
- Wong, C. S., & Law, K. S. (2002). The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *Leadership Quarterly*, 13, 243-274. doi:10.1016/S1048-9843(02)00099-1

DATA STORAGE FACT SHEETS

Data storage fact sheet 1 (21/04/2015)

% Data Storage Fact Sheet 1 (versie 21 april 2015)

% Data Storage Fact Sheet <Phd Elke Veirman, Chapter 2, Study 1>

% Author: Elke Veirman

% Date: 21/04/2015

1. Contact

1a. Main researcher

- name: Elke Veirman
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Elke.Veirman@UGent.be

1b. Responsible ZAP (if different from the main researcher)

- name: Johnny R. J. Fontaine
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Johnny.Fontaine@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

* Reference of the publication in which the datasets are reported:

- Veirman, E., Brouwers, S. A., & Fontaine, J. R. J. (2011). The assessment of emotional awareness in children: Validation of the Levels of Emotional Awareness Scale for Children, *European Journal of Psychological Assessment*, 27, 265-273. doi:10.1027/1015-5759/a000073
- Veirman, E. (2015). Emotional intelligence in children and adolescents: In search of a theoretical framework and improved assessment methods. PhD dissertation, Chapter 2, Study 1.

* Which datasets in that publication does this sheet apply to?:

All datasets reported in publication and PhD dissertation chapter.

3. Information about the files that have been stored

3a. Raw data

* Have the raw data been stored by the main researcher? ☒ YES / ☐ NO

If NO, please justify:

* On which platform are the raw data stored?

☒ researcher PC

☒ research group file server

☐ research group file server via DICT

☒ responsible ZAP PC

* Who has direct access to the raw data (i.e., without intervention of another person)?

☒ main researcher

☒ responsible ZAP

☐ all members of the research group

☐ all members of UGent

☐ other (specify): ...

3b. Other files

* Which other files have been stored?

- ☐ file(s) describing the transition from raw data to reported results. Specify:
- ☒ file(s) containing processed data. Specify:
 - LEAS-C_raw data transformed data.sav. This file contains the raw data that have been collected for this study and the transformed data thereof.
- ☒ file(s) containing analyses. Specify:
 - All *Mplus* input files (.inp) and output files (.out)
 - All SPSS output files (.spo)
- ☐ file(s) containing information about informed consent. Specify: ...
- ☐ a file specifying legal and ethical provisions. Specify: ...
- ☐ file(s) that describe the content of the stored files and how this content should be interpreted. Specify:
- ☒ other files. Specify: raw data file:
 - LEAS-C_M-PLUS scores.dat. This file contains only the scored LEAS-C data, used to run the structural analyses in *Mplus*.

* On which platform are these other files stored?

- ☒ individual PC
- ☒ research group file server
- ☒ other: responsible ZAP PC

.

* Who has direct access to these other files (i.e., without intervention of another person)?

- ☒ main researcher
- ☒ responsible ZAP
- ☐ all members of the research group
- ☐ all members of UGent
- ☐ other (specify): ...

4. Reproduction

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* If yes, by whom (add if multiple):

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Data storage fact sheet 2 (21/04/2015)

% Data Storage Fact Sheet 2 (versie 21 april 2015)

% Data Storage Fact Sheet <Phd Elke Veirman, Chapter 3, Study 1>

% Author: Elke Veirman

% Date: 21/04/2015

1. Contact

1a. Main researcher

- name: Elke Veirman
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Elke.Veirman@UGent.be

1b. Responsible ZAP (if different from the main researcher)

- name: Johnny R. J. Fontaine
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Johnny.Fontaine@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

* Reference of the publication in which the datasets are reported:

- Veirman, E. (2015). Emotional intelligence in children and adolescents: In search of a theoretical framework and improved assessment methods. PhD dissertation, Chapter 3, Study 1.

* Which datasets in that publication does this sheet apply to?:

All datasets reported in PhD dissertation chapter.

3. Information about the files that have been stored

3a. Raw data

* Have the raw data been stored by the main researcher? ☒ YES / ☐ NO

If NO, please justify:

* On which platform are the raw data stored?

☒ researcher PC

☒ research group file server

☐ research group file server via DICT

☒ responsible ZAP PC

* Who has direct access to the raw data (i.e., without intervention of another person)?

☒ main researcher

☒ responsible ZAP

☐ all members of the research group

☐ all members of UGent

☐ other (specify): ...

3b. Other files

* Which other files have been stored?

- ☐ file(s) describing the transition from raw data to reported results. Specify:

- ☒ file(s) containing processed data. Specify:

- LEAS-C_raw data transformed data.sav. This file contains the raw data

that have been collected for this study and the transformed data thereof.

- ☒ file(s) containing analyses. Specify:
 - All *Mplus* input files (.inp) and output files (.out)
 - All SPSS output files (.spv)
- ☐ files(s) containing information about informed consent. Specify: ...
- ☐ a file specifying legal and ethical provisions. Specify: ...
- ☐ file(s) that describe the content of the stored files and how this content should be interpreted. Specify:
- ☒ other files. Specify: raw data file:
 - LEAS-C_raw data coded data_all.xlsx. This file contains all written transcriptions of the participants and the componential coded transcriptions. These transcriptions were coded by one coder.
 - LEAS-C_raw data coded data_selection.xlsx. This file contains a selection of the full file of transcriptions. These transcriptions were coded with the componential scoring procedure by two independant coders to examine the inter-rater reliability.
 - LEAS-C_M-PLUS scores original.dat. This file contains only the LEAS-C data scored with the original scoring procedure, used to run the structural analyses in *Mplus*.
 - LEAS-C_M-PLUS scores componential.dat. This file contains only the LEAS-C data scored with the componential scoring procedure, used to run the structural analyses in *Mplus*.

* On which platform are these other files stored?

- ☒ individual PC
- ☒ research group file server
- ☒ other: responsible ZAP PC

.

* Who has direct access to these other files (i.e., without intervention of another person)?

- ☒ main researcher
- ☒ responsible ZAP
- ☐ all members of the research group
- ☐ all members of UGent

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Data storage fact sheet 3 (21/04/2015)

% Data Storage Fact Sheet 3 (versie 21 april 2015)

% Data Storage Fact Sheet <Phd Elke Veirman, Chapter 4, Studies 1-2>

% Author: Elke Veirman

% Date: 21/04/2015

1. Contact

1a. Main researcher

- name: Elke Veirman
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Elke.Veirman@UGent.be

1b. Responsible ZAP (if different from the main researcher)

- name: Johnny R. J. Fontaine
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Johnny.Fontaine@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

* Reference of the publication in which the datasets are reported:

- Veirman, E., & Fontaine, J. R. J. (in press). Revisiting the dimensional structure of the emotion domain, *Cognition and Emotion*, doi: 10.1080/02699931.2014.963518
- Veirman, E. (2015). Emotional intelligence in children and adolescents: In search of a theoretical framework and improved assessment methods. PhD dissertation, Chapter 4, Studies 1-2.

* Which datasets in that publication does this sheet apply to?:

All datasets reported in publication and PhD dissertation chapter.

3. Information about the files that have been stored

3a. Raw data

* Have the raw data been stored by the main researcher? ☒ YES / ☐ NO

If NO, please justify:

* On which platform are the raw data stored?

☒ researcher PC

☒ research group file server

☐ research group file server via DICT

☒ responsible ZAP PC

* Who has direct access to the raw data (i.e., without intervention of another person)?

☒ main researcher

- ☒ responsible ZAP
- ☐ all members of the research group
- ☐ all members of UGent
- ☐ other (specify): ...

3b. Other files

* Which other files have been stored?

- ☐ file(s) describing the transition from raw data to reported results. Specify:
- ☒ file(s) containing processed data. Specify:
 - FREE LISTING_raw data_coded data.xlsx. This file contains all written transcriptions of the participants and the coded transcriptions. These transcriptions were coded by one coder.
 - FREE LISTING_random emotion words.xlsx. This file contains the randomization of the emotion list that is used for the similarity rating study.
 - SIMILARITY RATING_pairwise similarity lists.xlsx. This file contains the different versions of similarity rating tasks that were administered, with specification of unique and overlapping pairs over the different lists.
 - SIMILARITY RATING_emotion word pairs.txt. This file contains the randomization of the emotion word pairs that are used to develop the different versions of similarity rating tasks that were administered
 - FREE LISTING_frequency.sav; FREE LISTING_MApplusMBcoded.sav; FREE LISTING_plots.sav; FREE LISTING_final.sav. These files contain the data that are needed to perform the different steps that were taken in the analyses.
 - SIMILARITY RATING_reliabilities.sav; SIMILARITY RATING_versionmerged1_14.sav; SIMILARITY RATING_versionmerged1_14_fullmatrix.sav; SIMILARITY RATING_similarities total.sav; SIMILARITY RATING_coordinates 76 terms 85 terms.sav; SIMILARITY RATING_weights.sav. These files contain the data that are needed to perform the different steps that were taken in the analyses.

- ☒ file(s) containing analyses. Specify:
 - All SPSS output files (.spv)
- ☐ files(s) containing information about informed consent. Specify: ...
- ☐ a file specifying legal and ethical provisions. Specify: ...
- ☐ file(s) that describe the content of the stored files and how this content should be interpreted. Specify:
- ☒ other files. Specify: raw data file:
 - SIMILARITY RATING_raw data.sav; SIMILARITY RATING_descriptives adult.sav; SIMILARITY RATING_descriptives child-adolescent.sav; SIMILARITY RATING_descriptives student.sav; SIMILARITY RATING_raw data adult.sav; SIMILARITY RATING_raw data child-adolescent.sav; SIMILARITY RATING_raw data student.sav. These files contain the raw data and the descriptive information on the participants.

* On which platform are these other files stored?

- ☒ individual PC
- ☒ research group file server
- ☒ other: responsible ZAP PC

.

* Who has direct access to these other files (i.e., without intervention of another person)?

- ☒ main researcher
- ☒ responsible ZAP
- ☐ all members of the research group
- ☐ all members of UGent
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Data storage fact sheet 4 (21/04/2015)

% Data Storage Fact Sheet 4 (versie 21 april 2015)

% Data Storage Fact Sheet <Phd Elke Veirman, Chapter 5, Studies 1-2>

% Author: Elke Veirman

% Date: 21/04/2015

1. Contact

1a. Main researcher

- name: Elke Veirman
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Elke.Veirman@UGent.be

1b. Responsible ZAP (if different from the main researcher)

- name: Johnny R. J. Fontaine
- address: Henri Dunantlaan 2, 9000 Gent
- e-mail: Johnny.Fontaine@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

* Reference of the publication in which the datasets are reported:

- Veirman, E. (2015). Emotional intelligence in children and adolescents: In search of a theoretical framework and improved assessment methods. PhD dissertation, Chapter 5, Studies 1-2.

* Which datasets in that publication does this sheet apply to?:

All datasets reported in PhD dissertation chapter.

3. Information about the files that have been stored

3a. Raw data

* Have the raw data been stored by the main researcher? ☒ YES / ☐ NO

If NO, please justify:

* On which platform are the raw data stored?

☒ researcher PC

☒ research group file server

☐ research group file server via DICT

☒ responsible ZAP PC

* Who has direct access to the raw data (i.e., without intervention of another person)?

☒ main researcher

☒ responsible ZAP

☐ all members of the research group

☐ all members of UGent

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3b. Other files

* Which other files have been stored?

- ☐ file(s) describing the transition from raw data to reported results. Specify:

- ☒ file(s) containing processed data. Specify:

- MSCEIT-YV1_raw data transformed data_all.sav; MSCEIT-YV1_raw

- data transformed data_split1.sav; MSCEIT-YV1_raw data transformed data_split2.sav. These files contain the raw and transformed data that have been collected for the first study.
- MSCEIT-YV2_raw data transformed data_all.sav; MSCEIT-YV2_raw data transformed data_split1.sav; MSCEIT-YV2_raw data transformed data_split2.sav. These files contain the raw and transformed data that have been collected for the second study.
 - ☒ file(s) containing analyses. Specify:
 - All *Mplus* input files (.inp) and output files (.out)
 - All SPSS output files (.spv)
 - ☐ files(s) containing information about informed consent. Specify: ...
 - ☐ a file specifying legal and ethical provisions. Specify: ...
 - ☐ file(s) that describe the content of the stored files and how this content should be interpreted. Specify:
 - ☒ other files. Specify: raw data file:
 - MEAN_PCA_BRANCH_STUDY_SAMPLE.sav files. These files contain all information at item level for each of the four branches, for Study 1 and Study 2, and for the complete sample and split 1 and split 2, separately.
 - MSCEIT-YV1_M-PLUS_scores original.dat. This file contains only the MSCEIT-YV data of the first study, used to run the structural analyses in *Mplus*.
 - MSCEIT-YV2_M-PLUS_scores original extra.dat. This file contains only the MSCEIT-YV data of the second study, used to run the structural analyses in *Mplus*.
- * On which platform are these other files stored?
- ☒ individual PC
 - ☒ research group file server
 - ☒ other: responsible ZAP PC
- .
- * Who has direct access to these other files (i.e., without intervention of another person)?
- ☒ main researcher

- ☒ responsible ZAP
- ☐ all members of the research group
- ☐ all members of UGent
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DANKWOORD

Na zeven jaar gewerkt te hebben aan dit doctoraat is het tijd om even stil te staan bij de voorbije periode. Ik had voorheen nooit gedacht dat ik na mijn opleiding Klinische Psychologie zou starten aan een doctoraat in de Psychologie en dit boek zou schrijven. Doorheen de opleiding bleef ik mateloos geboeid in hoe menselijk gedrag kan worden beschreven, begrepen en voorspeld. Toen ik mijn thesisonderwerp koos bij Herbert Roeyers en een empirische studie uitvoerde naar angststoornissen bij kinderen en adolescenten met een autismespectrumstoornis wist ik al snel dat ik sterk geboeid was door wetenschappelijk onderzoek. Binnen het doctoraat kon ik het veld van het wetenschappelijk onderzoek verder betreden en me verdiepen in onderzoek naar emoties en emotionele intelligentie. Het finaliseren van dit doctoraat is het eindresultaat van veel denkwerk, hard werken, grenzen aftasten, en horisonten verruimen. Dit was uiteraard niet mogelijk geweest zonder de steun, de hulp, de inzet, en de inspiratie van heel wat mensen die ik hier graag zou willen bedanken.

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Verder wil ik graag de leden van mijn begeleidingscommissie, Wim Beyers, Peter Kuppens, Herbert Roeyers, en Stijn Vanheule bedanken. Jullie constructieve feedback, verhelderende inzichten, en stimulerende ideeën hielpen me om mijn onderzoek vanop afstand te bekijken en in een bredere invalshoek te plaatsen.

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ontdekken en voorruit te gaan. Ik kan zoveel energie en moed putten uit jullie aanstekelijke glimlach en puurheid.